Published every Saturday by the Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa., with editorial and executive offices: 30 Church Street, New York, N. Y., and 105 West Adams Street, Chicago, Ill.

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The Railway Age is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

Subscriptions, including 52 regular weekly issues, and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free. United States, U. S. possessions and Canada: 1 year, $6.00; 2 years, $10.00; foreign countries, not including daily editions: 1 year, $8.00; 2 years, $14.00.

Single copies, 25 cents each.

H. E. McCandless, Circulation Manager, 30 Church St., New York, N. Y.

Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name registered U S. Patent Office.

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RAILWAY AGE

Politics and Economics of the Railroad Problem

The railway labor leaders are trying to make a political issue of the question of a reduction of wages. A statement of A. F. Whitney, president of the Brotherhood of Railroad Trainmen, is typical of their utterances. He said in part on June 30: "The attempt to bring about a cut in wages and a lessening of buying power of (railway) employees is an attempt to defeat the efforts of President Roosevelt and of every person interested in economic recovery. . . . We are on the way to economic and industrial recovery. . . . (Railway) employees . . . will never join with . . . any group who seek to delay recovery and are willing to stab our President in the back. . . . This government of ours has been too fair to the railroads—has loaned them hundreds of millions of dollars in their hour of need and distress. To desert President Roosevelt and this government now would be rank disloyalty and treachery."

Such utterances of labor leaders help explain a fact of importance. They agreed to a 10 per cent deduction from basic wages in January, 1932. They declare they will call a strike rather than agree to any reduction of higher wages in 1938, largely because they are receiving in 1938 a political encouragement that they did not receive six years ago. President Hoover in 1929 asked the railroads and other industries to maintain wages. But when, in January, 1932, the railroads sought a reduction, President Hoover and other politicians did not interfere; and an agreement for a reduction was reached. After the railways this year started their movement for a 15 per cent reduction, President Roosevelt in a press conference expressed opposition to it. Also certain senators made it a condition of their support of railway "relief" legislation that the railways should stop their wage movement; and the legislation failed.

The Roosevelt Administration and the Railways

If their economic arguments were as strong as the political arguments they can use the labor leaders would have a good case. But what does five years' experience actually show the railways could reasonably expect from the Roosevelt administration if they yielded to the political argument—as, in fact, they did in 1937? This paper has said repeatedly that the Roosevelt administration has been more friendly to the railways than any other administration in many years. That statement can no longer be made. The railways have cooperated with the administration in important ways heretofore emphasized in these columns. In the first one-half of 1938, however, when the railroads were in the greatest need and distress they have ever been, the administration completely let them down. It knew how terribly acute and important to the public their problem was. It had ample opportunity to urge upon Congress, shippers and labor the adoption of policies apparently necessary to prevent many more bankruptcies and terrific losses to railway security-owners. It did not do so. Instead, it devoted all its political strategy and pressure to promoting certain kinds of very questionable "reform" legislation more likely to injure than help the railways. It has been rumored that a special session of Congress will be called to deal with the railroad problem. It is understood that, if there is no special session, important railroad legislation will be considered at the next regular session. Meantime, as far as the administration is concerned, the entire railroad industry can go to perdition.

After this experience railway managements would be foolish to rely upon the favor of the New Dealers rather than upon their utmost efforts. They can honorably and safely give weight to appeals and arguments for them to "back the President" only to the extent to which they honestly believe that backing him will be in the interest of their employees, security-owners and the public. Now he and his political supporters have given no evidence or assurance whatever that, regardless of what railway managements may do, the New Deal will do a thing to help increase railway net operating income; and there is no solution of the railroad problem under private ownership excepting an increase of net operating income.

Mr. Whitney said, "We are on the way to economic and industrial recovery." The *Railway Age* (issue of June 18) was the first publication or agency to publish widely quoted data and comments indicating that improvement in business had begun. There has since occurred a sharp increase in stock market prices. But how much has business actually improved since the recession reached bottom? Freight loadings adjusted for seasonal changes indicate that between the two

weeks ending May 14 and the week ending June 25 there was an improvement of 2.6 per cent. And how bad is business now? As measured by freight loadings, the total volume of production and commerce at the end of June was about 45 per cent smaller than it averaged in the five years 1925-1929; 12 per cent larger than in 1932; 8½ per cent smaller than in 1933, and 26 per cent smaller than in 1937.

Concerning "Recovery"

Plainly, there will have to be much more improvement before there will be anything that can be called "recovery." And the entire experience of the world, and especially experience in the United States during the last five years, negatives any reasonable hope that there ever can be full recovery under such government economic policies as have prevailed in this country during the last five years and still prevail—unless and until our business leaders, including our railway leaders, courageously adopt in their management of business such policies as all experience shows are essential to recovery.

We have had, first, two years of stagnation under present government policies; then two years of improving business; and finally one year of the sharpest recession ever known. In the best year under these policies—1937—freight loadings were 27 per cent smaller than they averaged in 1925-1929. In the best month under them freight loadings were 20 per cent smaller than they averaged in 1925-1929. Under the prevailing policies of government, business and labor there would probably be again such increases and declines of business on an abnormally low level as have occurred for five years; but until these policies are changed there will be no full recovery because they inevitably prevent full renewal of the investment of private capital by private enterprise; and there never can be real recovery without revival of investment.

High Wages and the Economists

For expressing such views, the *Railway Age* has been and still is suffering much castigation, especially from labor leaders. Well, we began saying in the summer of 1933 that the New Deal policies then being tried would arrest the recovery that began almost a year before, and have been saying much the same thing ever since. Meantime, there has never been anything resembling recovery; and in June, 1938, and thus far in July freight loadings have been smaller than in June and July, 1933. Have we or our critics been right, then?

In a recent editorial we contended that high wages, instead of increasing mass purchasing power and promoting recovery, may have the opposite effect. George M. Harrison, chairman of the Railway Labor Executives' Association, in the June issue of "Railway Clerk," remarked that "by this startling discovery much of the literature of the science of economics, especially that of the last quarter of a century, is consigned to the ash can." The real literature of economics is written by economists. The writer of this editorial has been studying the literature of economics, ancient, medieval and modern,—including that of Karl Marx—almost every day for more than forty years, and hazards the estimate that at least 90 per cent of all writers of reputation on economics, dead or living, agree with the views expressed by the *Railway Age* on the wage question. Obviously if the nation could be made prosperous merely by making wages high it would be more prosperous now than in 1929, because wages are higher now; and by doubling or trebling wages it could immediately make itself two or three times as prosperous as in 1929. The problem of creating prosperity is not so simple as economic illiterates believe.

As Mr. Harrison has appealed from the *Railway Age* to the economists, let us cite some modern authorities. At the meeting of the American Economic Association last December there was a round-table discussion of wage policies which does not reveal a single speaker who contended that "purchasing power" would necessarily be increased by wage increases in a depressed industry. On the contrary, one speaker (Carrol R. Daugherty) stated categorically:

> No matter how socially desirable it may be to increase relative average worker income and employment, such an objective is not generally attainable through substantial, arbitrary wage rate increases and work period reductions under the present economic system. Even assuming that one of the major causes of depression is lack of balance between consumer buying power and savings (brought on perhaps by inequalities in income distribution), one cannot say that recovery from depression can be achieved by reversing the process, i. e., by arbitrarily raising wage rates. A wage rate increase is an added cost of production more immediately than it is added purchasing power.

The Views of Dr. Ezekial

Mr. Harrison can hardly object to Dr. Mordecai Ezekial as an authority. Dr. Ezekial is the most prominent of New Deal economists, and has had an important place from the beginning among the planners of the planned economy. In the discussion referred to he "raised the question whether reductions in wage rates, accompanied by an increase in the number of hours worked and in total wage payments, might not have effects quite different from reductions in wage rates not so accompanied." Dr. Ezekial has also said: *"High prices and high wages are mutually destructive. What is needed is some way of getting continually more men at work with gradually rising pay but with no increase in costs and prices."* This statement of the economic high priest of the New Deal happens to be exactly in accordance with the views of the *Railway Age*—and therefore exactly contrary to those of Mr. Harrison and other labor leaders.

Many economists, it is true, have held that wage advances in times of prosperity are not only in the interest of labor, but necessary in order to increase mass

purchasing power and maintain prosperity. Unfortunately, in such discussions as are now occurring, certain vitally important facts are usually disregarded. One is that large parts of the population, such as the farmers, do not work for wages. It follows that if wages increase more than the incomes of non-wage earners, the advances in wages are made largely or entirely at the cost of reduced purchasing power of non-wage earners. The advocates of advances in wages usually assume that industry will bear them through reduced profits. Curtailment of the profits of any particular industry, or of industry as a whole by advances in wages when business is good may be desirable or undesirable; but experience shows that advances in wages when business is bad are almost certain to cause advances in prices and curtailment of profits, both of which, at such a time, retard recovery.

Wages in Prosperity and Depression

This brings us to the vitally important distinction usually disregarded between *money* wages and *real* wages. *Real* wages are the amount of necessities, comforts and luxuries the worker can buy with his pay. If the prices and rentals he must pay are increased as much or more as his money wages there occurs no increase in his *real* wages or purchasing power. Furthermore, suppose an advance in the wages of the employees of an industry compels it because of general economic conditions or its own financial condition at the time, to reduce the number of its employees in proportion to the advance in wages. In that case, as the *total* amount paid to its employees is not increased, neither is their total purchasing power.

The *Railway Age* is an advocate, not an opponent, of high *real* wages. What it contends is that the level of hourly wages at any given time should be determined by the economic conditions prevailing at the time. When prosperity is increasing real wages, hourly, weekly and annual, should increase in order that the incomes of wage earners shall increase in proportion to the increases occurring in the incomes of other classes of the people doing equally valuable work. But what is the measure of prosperity? It is the *total production of goods and services per capita.* And what is the measure of the wage that each worker should receive? It is the value of his contribution toward the production of these goods and services.

The goods or services constituting the output of each industry are produced jointly by its management, labor and capital; and each of these, if the industry is to be kept in existence under private ownership, must be paid enough of its gross earnings to enable each of them to make its essential contribution to the industry's output. If total output and gross earnings increase, the amounts of gross earnings paid to management, to labor and also to capital, should increase. If total output and gross earnings decline because of depression the amounts of gross earnings paid to each of them should decline. There usually being no decline during depression in the total capital in an industry, this means a decline in earnings per dollar of investment. A decline in the gross earnings going to labor necessarily means either a reduction in the number of employees or in the amount paid per employee.

Have High Wages Caused Recovery?

Labor leaders will unhesitatingly agree that the total and average wages of labor should increase when the gross earnings of an industry increase. How, then, can they contend also that the total and average wages of labor should not decline, or should actually increase, when gross earnings decline? Only upon the theory (1) that the total and average amount paid to labor should be maintained *regardless of how much this will reduce the pay of management and capital* or upon the theory (2) that a reduced amount should be paid to labor and *divided among fewer employees.* The former theory would bankrupt every industry to which it was applied in a period of depression. The latter would intensify unemployment in every industry to which it was applied in a period of depression, and by reducing the total amount of work done, would reduce the total amount of goods and services produced—in other words, it would maintain the incomes of the wage earners remaining employed, while reducing the national income and thereby the incomes of all excepting employed wage-earners.

But labor leaders do not now ask only that wages be advanced in periods of prosperity. They ask also that they be increased in periods of depression to increase mass purchasing power and thereby restore prosperity. But they have been increased during the present depression, and are now the highest in history. Has this restored prosperity? It has not; nor has it prevented the "recession" during the last year which reduced the country to a depth of depression as low as it reached in 1932 or 1933. Wages always declined in every previous period of depression in this country, and subsequently as prosperity was restored increased to a new high level. Is it entirely unreasonable, then, to believe that one of the principal causes of the unprecedented length of this depression is that during it wages—and also prices—have been dealt with entirely differently from the way they were dealt with in any previous depression?

Economic Authorities on Government Spending

The claim of the labor leaders and others that recovery will occur rapidly if wages are not now reduced undoubtedly is based largely upon the latest government lending and spending program, which they indorse, as they have indorsed similar previous programs. As Mr. Harrison has appealed from the *Railway Age* to the economists, let us appeal to the economists regarding that matter. The Economists' National Committee

on Monetary Policy has 56 members of whom 48 are professors of economics in 36 leading American universities. On May 23 the members of this committee issued a statement in which they said they "believe that it is *unsound public policy* for the federal government to resort to a program of greatly expanded government spending—so-called 'pump-priming'—as a device for overcoming the present depression. . . . An important question arises as to whether further substantial increase in the federal debt *may not frighten from productive channels more private capital* than the government can add through its program of spending. Confidence in the credit of the government and in the nation's currency is a basic foundation for that general confidence on which a free flow of private capital and a widespread and healthy expansion of business rest."

It is the New Deal and the labor leaders, not the *Railway Age,* that are expressing views and advocating policies defying all the authoritative economic literature of the world, past and current.

Responsibility and Duty of Business Leadership

There is no difference among those desiring to maintain American political and economic institutions regarding *objectives.* They all desire recovery, prosperity and increases in the incomes and purchasing power of the masses, whether wage earners or non-wage earners. The differences of opinion are regarding the best *means* of attaining these objectives. The railroads, in order to contribute their share toward attainment of these objectives, must have increases in their traffic, their gross earnings and their net operating income. They cannot reasonably hope to have, under present government policies, any larger increases in their gross earnings due to increases in their traffic than have occurred during the last five years unless leaders in important industries shall courageously adopt and carry out business policies calculated largely to increase production and construction in spite of these government policies.

On the basis of present rates and the volume of traffic they have had within the last seven years, even in 1937, the railways cannot continue to pay present wages, prices and taxes and earn enough net operating income to enable them largely to increase their buying from the durable goods industries. But if they cannot largely increase their buying they cannot improve or even maintain their properties, much less afford business and employment to the industries from which it is necessary they should make large purchases if they are to contribute their share toward improvement in business.

Certainly the railroads should "back the President" in all policies tending to *promote* recovery. But should they back him in policies their managements believe will tend to *prevent* recovery? In other words, should they back him *politically* or *economically*? Experience shows the President is a great political leader. It also shows he has been such a very poor economic leader for five years that under his economic leadership the nation has made less than no real progress toward recovery and that the railroads have steadily deteriorated into the worst condition financially in which they ever have been—far worse than in 1932 or 1933. And there is at present, unfortunately, no reason whatever for believing the President's economic leadership will be any better in future than during the last five years.

And meantime the managements of the railroads have their own responsibility and duty—a responsibility and duty from which the President cannot legally or morally relieve them—a responsibility and duty to the hundreds of thousands of unemployed railroad men, to railway security-owners and to the public. And this responsibility and duty require them, not to play politics with the future of the railroads, but to do immediately and constantly the things *they* honestly believe necessary to save the industry from bankruptcy and government ownership, whether the President approves them or not. The President has had his chance for five years, and especially since railway wages were advanced last year, to help solve the railroad problem; and the net result to date does not cause appeals to "back" him to inspire enthusiasm among those desiring avoidance of general railroad bankruptcy.

Even the Leftists Begin to Get the Idea

There is no question about the need of the roads for equipment. In 1937 the railroads experienced a car shortage, and every day that passes sees obsolescence grow more acute. The powerful new locomotives that some roads acquired last year are being run over old tracks and with ancient signal systems that make it impossible for them to be run at full speed. And the work that such buying would provide is impressive. To build a freight car requires materials from 31 different states and provides 1,987 man-hours of work—approximately a year's work for one man. The building of one locomotive gives 50 men full-time work for one year and requires materials from more than 30 states. Of the money put into all types of railroad work, about 20 cents of each dollar goes immediately into labor, the rest into materials. But the unique advantage of spending in these capital goods industries is that all these orders for materials force increased capital expenditures on the part of private industry and pyramid employment in geometric proportion to the original outlay.

To illustrate this, the Department of Labor has prepared a comprehensive breakdown tracing back the man-hours required to build 100,000 fifty-ton box cars, all the way from equipment shops, through foundries and steel mills, to coal mines and brick yards. To produce these 100,000 cars, the number that should be built annually to overcome the present shortage, would require nearly 227,000,000 man-hours, or a year's employment for 115,000 men. Locomotives, track, and shop equipment must be added, all of them equally potent providers of employment. Here is a unique opportunity to spread employment and increase production throughout the country with record speed. Will the Administration continue to turn a deaf ear to those of its members who have been telling it to face the facts?

Eliot Janeway in "The Nation"

Photo Courtesy C. B. & Q. R. R.

Exterior of the First United States Railway Mail Car

100 Years of Rail Mail Service

Act of Congress designating all roads as post routes was approved July 7, 1838

THURSDAY of this week—July 7—was the 100th anniversary of the approval of the act of Congress designating every railroad in the United States as a post route—the centenary of the establishment of railway mail service on an official basis. Prior to that time railroads had carried some mail for contractors who made their own arrangements with roads offering more expeditious service than stage coaches and other transport agencies. Today the railroads play the major role in getting mail from one place to another, transporting approximately 85 per cent of the total.

The law approved July 7, 1838, stated that "each and every railroad within the limits of the United States which now is, or hereafter may be made and completed, shall be a post route, and the Postmaster General shall cause the mail to be transported thereon, provided he can have it done upon reasonable terms, and not paying therefor in any instance more than 25 per centum over and above what similar transportation would cost in post coaches." This 1838 law was amended on January 25, 1839, to set the maximum rate of compensation at $300 per mile per year for the conveyance of one or more daily mails. The weight basis of payment came in 1873 when Congress established a scale of rates based on the average daily weight, to be determined by weighing the mails not less frequently than once every four years. This prevailed until 1916 when Congress authorized the space basis, which, with the approval of the Interstate Commerce Commission, has since become the uniform basis for payments.

Slow Transition from Stage to Rails

As early as 1831 the government's contracts with mail forwarders had begun to make references to the possibility of the contractors employing railroad transportation, but the transition from the stage coach to the railroad was a slow process. In some of the earlier years many communities were not reached by rail; train schedules were uncertain and slow; and stage coaches were considered safer. There were instances wherein the horse was awarded the contract because it made quicker time than the railroad.

From the very beginning, however, mail transportation by rail was looked upon with favor by the Post Office Department. In his annual report for 1834 Postmaster General William T. Barry said: "The multiplication of railroads in different parts of the country promises, within a few years, to give great rapidity to the movements of travelers, and it is a subject worthy of inquiry whether measures may not now be taken to secure the transportation of the mail upon them." During the next year there occurred one of the earliest transfers of mail from the stage to railroads—on the Baltimore, Md.-Washington, D. C., route where the railway was opened August 25, 1835.

An 1835 Co-ordinator

The transition period brought forth all kinds of suggestions as to how the railroads could best be operated for the conveyance of mail. After suggesting that the railroad company might be asked to close in some portion of its baggage car, a strong lock being placed on the compartment, to which only the postmasters at Washington and Baltimore should have keys, Postmaster General Amos Kendall emerged as something of an 1835 co-ordinator when he went on to propose that the Post Office Department "will furnish a strong fire-proof box or chest, so constructed that it may be readily transferred from a wagon to a car prepared for the purpose . . . or if wheels can be constructed which can be used

Photo Courtesy U. S. Post Office Dept.

Interior of Modern Mail Car Showing Arrangement of Mail Bags Into Which Mail Is Sorted According to Destination

alike upon the railroad and the streets of the city, respectively, the Department will furnish an entire car, to be delivered at one depot and received at the other, asking nothing of the company but to haul it from one to the other." Other proposals included the suggestion that the government run mail trains with its own locomotives, everything else on the railroad yielding the right-of-way to those trains; and the recommendation that the federal government acquire a financial interest or at least some form of control in all rail lines.

The first record of a clerk's being appointed to take charge of the mail on a train was in May, 1837, while in June, 1840, two agents were ordered to accompany the mails from Boston, Mass., to Springfield "to make exchanges of mail, attend to delivery, and receive and forward all unpaid way letters and packages received." The first temporary route agents were appointed in 1841 when an order was issued for the payment of two agents for service on Route 909 between Utica, N. Y., and Auburn. By 1845 there were 3,900 miles of railroad upon which mail was carried; and it afforded "pleasure" to the then Postmaster General to testify that "the service rendered by these companies to the Department has been, in the main, of the most acceptable character."

Prior to 1845 the Post Office Department had advertised for bids for rail transportation of mail. In that year Congress authorized the entering of contracts without that formality, and directed the Postmaster General to group routes into three classes on the basis of the volume of mail and the importance and speed of the service. The new rates (still on the route-mile basis) ranged from the above-mentioned maximum of $300 per mile per year for first-class routes to $50 per mile per year for third-class routes.

The idea of sorting on the train was considered almost from the beginnings of the railway mail service. During the 'Forties investigators were sent to Europe to study such practices; but their unenthusiastic reports caused the idea to be dropped for the time. Improvements in other directions continued, however, including 1860's three-months' experiment with a night mail between New York and Boston. As a result of this arrangement—one of the earliest attempts to co-ordinate several distinct railroads into one continuous line—the time between the two cities was reduced to nine hours, and a connection made in New York with the morning mail from the South which was expedited 13 hours. Letters and passengers leaving Washington in the morning arrived at Boston in less than 23 hours. The success of this experiment brought about arrangements for a permanent New York-Boston night mail; while another from New York to Washington was soon added.

Meanwhile the stage coach continued to give the railroads keen competition in the handling of mail; even as late as 1860 there were those who maintained that the stage and the steamboat were superior to the railroad for that purpose. It fell to the lot of the Hannibal & St. Joseph (now part of the Chicago, Burlington & Quincy) to prove that they were wrong. This historic railroad wanted the contract to take the mail across Missouri for connection with the Pony Express that carried it west from St. Joseph. To demonstrate that it could do a faster and better job than the stage, the railroad undertook a trial of speed, which still lives in Missouri song and story. On the day of the race, in 1860, Engineer Addison Clark was told to "make a record that will stand for 50 years." With this order Clark ran his wood-burning locomotive, the "Missouri," from Hannibal to St. Joseph—a distance of 206 miles—at an average speed of 50 m. p. h., pushing the locomotive far beyond its supposed limit over a railroad scarcely a year old. The H. & St. J. got the contract.

First "Post Office on Wheels"

A little more than two years later this same road had the distinction of inaugurating the first "post office on wheels," the actual starting point of today's Railway Mail Service. On April 3, 1860, the H. & St. J. started carrying overland mail from West Quincy across Missouri to St. Joseph, where intrepid riders of the Pony Express waited to begin their long relay journey to Placerville, Calif. Frequently, the train had to wait for the mail connection from the East; sometimes it jumped the track on its trip across Missouri, or was delayed for other reasons. Added to these uncertainties was the necessity for spending several hours sorting the mail according to destination after the train reached St. Joseph.

Among those irked by such delays was William A. Davis, assistant postmaster at St. Joseph. He conceived the idea of having the mail sorted on the train so that it could be transferred immediately to the Pony Express, and was authorized to try out the plan. Two mail cars were soon built in the H. & St. J. shops at Hannibal. Each was equipped with 65 pigeon holes, but there were no racks, the pouches being hung on hooks under the letter-case table. The sorting of mail in transit on this line was ordered by Postmaster General Montgomery Blair on July 7, 1862; and 19 days later, with locomotive "Hannibal No. 1" pulling the train, the first distributing railway postal service in this country was inaugurated between West Quincy and St. Joseph. The first mail car eastbound over the line was hauled by the "Missouri" with Addison Clark at the throttle.

As a result of this new service the delay at St. Joseph was eliminated; the overland coaches, which by then had succeeded the Pony Express, were able to depart promptly; the transcontinental mail service was speeded up as

much as 14 hours. Similar distribution of mail on a train while en route was begun between Chicago and Clinton, Iowa, on August 28, 1864, after George B. Armstrong, Chicago's assistant postmaster, made arrangements with the Chicago & North Western to fit up a compartment in a baggage car like a small post office. This was soon followed by railway mail service between New York and Washington, between Chicago and Rock Island, Ill., and between New York and Erie, Pa. In the beginning letters comprised the bulk of the mail sorted en route; about five years later cars were equipped to handle papers in transit. Originally letter packages were placed in iron-bound boxes, which were later replaced by "bull hides," or all-leather pouches. Next in turn came canvas pouches with leather tops, and the all-canvas sacks of today.

Meanwhile, beginning in 1861 and continuing for several years, there was a falling off in all methods of mail transportation, due to the discontinuance of service in many Southern states during the Civil War. In 1865, Postmaster General William Dennison issued a circular letter, promulgating rules for the restoration of service in the South. Southern roads were reclassified and every effort was made to supply the best mail service. This circular letter resulted in a very considerable addition to the previous railway mail route mileage. In his annual report for 1866, the Postmaster General grew eloquent over the benefits of railway mail transportation, citing it as an example of "the increasing wealth and prosperity of the Union and the energy and intelligence of the people."

Inauguration of the Fast Mail Service

Congress got busy again in 1873, passing the law, which, as stated above, established the weight basis of payments. This law further required the railroads to provide suitable rooms, fixtures and furniture in the mail cars, which were also to be properly heated and lighted, for railway postal clerks to accompany and distribute the mail. Two years later, in 1875, came one of the most important forward steps in the history of the Railway Mail Service—the inauguration of the first fast mail service. Prior to that time, the whole country had never been treated as a unit with respect to the transmission of mails. There was fast service on separate lines, but its value was neutralized by delays at connecting points. This situation was corrected by a new system, which consisted not so much in greatly increasing the speed of any one train as in connecting scattered links, thus making the speed of existing trains effective—giving unity and life to what had before been disconnected and sluggish. The first experimental fast mail train left New York on September 16, 1875, over the New York Central & Hudson River, now New York Central, a similar train going over the Pennsylvania on the same date. By 1877 such services had been installed on most of the important routes.

The year 1875 saw 70,083 miles of railroad upon which mail was carried, and rapid progress was made in the next 25 years. By 1900 the total mileage had reached 179,982; and today mails are carried on 194,599 miles of railroad.

Payment on the space basis, as stated above, was authorized by Congress in 1916, the act giving the Interstate Commerce Commission authority to decide whether that method should be finally adopted, and, if so, to establish fair and reasonable rates. On November 1, 1916, Postmaster General Albert S. Burleson, with the approval of the I. C. C., placed the space basis in effect on 1,824 routes, while the weight basis continued for several years on 1,157 routes. At present the space basis prevails on all routes.

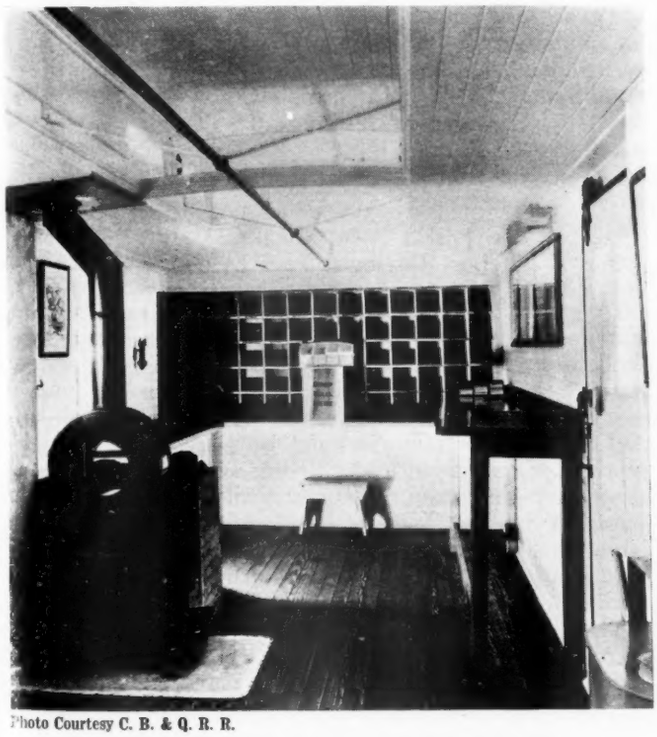


Photo Courtesy C. B. & Q. R. R.

Interior of First United States Railway Mail Car

Air-Mail Deficit vs. Train-Mail Net

In connection with payments to railroads for the transportation of mail, it is interesting to note that the latest Post Office Department report shows that, in 1937, the ratio of payments to air-mail contractors to revenue was 1.023. In other words, the government paid the air lines slightly more than it collected in air-mail postage. On the other hand, the ratio of payments for the transportation of mail by railroad to the revenue was 0.183, i. e., the railroads last year received less than one-fifth of the total revenues collected on train mail. Further data in this connection are given in the accompanying table.

Railroads are constantly striving to better the service which they provide for the transportation of mail. Notable among the improvements is the greater speed of trains. In 1870, for instance, the time in transit for mail from Washington, D. C., to San Francisco, Calif., a distance of 3,035 miles, was 161 hours. This was cut to 109 hours by 1900 and to 80 hours by 1933. Now the route is covered in 70 hours. Train performance is extremely important to mail delivery, and thus inspectors and other railroad employees spend a large part of their time riding trains, checking mail traffic and making observations. A co-operative spirit exists between the Post Office Department and the railroad companies. Although the latter are required by law to carry mail on any train operated, it is not incumbent upon them to run trains for the mail or adjust schedules for that purpose. The railroads, however, invariably try to and do fix their schedules to meet the needs of the mail service.

Mail must have preferential handling at all times. It must be carried on first sections of all trains operated; and if for any reason a train carrying mail is stalled, and it becomes necessary for a following train to run around it, the mail on the stalled train must be transferred to the other. At stations where baggage, express, milk and

mail are handled mail must be handled first. A train may not depart from a station until all mail there is loaded; it must even wait for mail in the process of being trucked from some other part of the station property.

Railway mail cars are provided and equipped by the railroads in accordance with government specifications.

Selected Postal Statistics

Fiscal Years Ended June 30, 1933 to 1937, Inclusive

	1937
Postal Revenues (Domestic)	
1st Class (other than local delivery & air mail)	$308,617,391.07
2nd Class (excluding 2nd class application fees)	24,363,969.48
3rd Class	71,778,340.70
4th Class (excluding local delivery)	130,068,093.38
Total	534,827,794.63
Air Mail (domestic)	12,439,579.24
Expenditures for Transportation of Domestic Mail	
By railroad	97,827,479.32
Ratio to postal revenue on mail assumed to move by rail	.183
Air Mail Service — Cost of Service	
Payments to contractors	*12,722,286.00
Ratio to air mail revenue	1.023
Air Mail Service	
Revenues—domestic	$12,439,579.24
Revenues—foreign	2,148,170.82
Total—revenues	14,587,750.06
Expenditures—domestic	19,177,129.28
Expenditures—foreign	7,121,695.44
Total—expenditures	26,298,824.72
Excess of expenses over revenues—domestic	6,737,550.04
Excess of expenses over revenues—foreign	4,973,524.62
Total—excess of expenditures	11,711,074.66
Rates of expenditures to revenues	1.803
Payments to air mail contractors	
Domestic	12,722,286.00
Foreign	7,874,670.60
Total	20,596,956.60
Ratio of payments to revenues	1.412

Prepared by the Bureau of Railway Economics, Association of American Railroads.

Source: Annual Reports of the Postmaster General—Tables 5, 17, 45 and 57.

* Subject to final adjustment.

Due to differences in traffic volume on the various routes, the cars are built in several sizes. The standard 60-ft. car has from 744 to 1,032 letter cases and 210 rack and overhead box separations, the latter for the distribution of bundles of letters and circulars and individual pieces of newspaper, periodical and parcel-post mail. On the lighter runs, cars containing 30-ft. or 15-ft. mail compartments are used.

Eastern Roads Get 2.5-Cent Coach Fare

WASHINGTON, D. C.

REVERSING its 6-to-5 decision of last April the Interstate Commerce Commission this week authorized Eastern railroads to increase their basic coach fares from 2 cents per mile to 2.5 cents for an experimental period of 18 months. This decision on further hearing in the passenger-fare phase of Ex Parte 123 came in record time; dated July 5 it was made public on July 6—one week after the close of the further hearing (reported in last week's *Railway Age*) and five days after June 30's oral argument

Commission Porter entered a vigorous dissent, asserting that the case "should be enlightening" to those "who wonder why the railroads are traveling the highway to oblivion." Commissioner Eastman noted his concurrence in the result for the reasons stated in his dissent to the prior report; while Commissioner Mahaffie, concurring in part, agreed with the majority that the increase was justified, but found no warrant for limiting it to a period of 18 months. Commissioner Miller agreed with Mr. Mahaffie.

Roads Entitled to Try for More Revenue

In the original decision in the case (reported in the *Railway Age* of April 23) the majority based its refusal to permit what it now authorizes upon its conviction that the 5-to-4 decision of February 28, 1936, ordering the reduction from 3.6 cents per mile to 2 cents, still comprised "the best solution thus far devised for the passenger difficulties of the Eastern railroads insofar as their coach service is concerned." The present report holds that "While the results from the present fare basis in the East and from the recently increased coach fare in the South are not conclusive that the instant proposal of the Eastern carriers, especially in this time of business stagnation, will result in revenue increases, the further hearing makes it inferable: First the financial condition of the applicants is such that every reasonable opportunity should be afforded to permit them to increase their revenues; second, that by reason of the increased cost of the passenger service and the improved accommodations quite generally accorded to coach passengers, the coach service regarded by itself today may be worth somewhat more to the traveling public than early in 1936 when we determined that the coach fare should not exceed 2 cents per mile; and, third, that in the absence of an actual test and careful analysis of the results we are left in doubt whether or not applicants can obtain greater revenue from the proposed fare basis than from the present basis."

The commission then goes on to stress this "uncertainty from a revenue standpoint" which surrounds the authorized 2.5-cent rate, adding that the basis which will yield the greatest possible revenue "can be determined with reasonable assurance only through the 'trial and error' method." Thus its belief that 2.5 cents "should be given a trial and that the period of such trial should be limited to 18 months." Next, in the interest of an adequate test, comes an expression of hope that state commissions will "see their way clear" to authorize, also for 18 months, a 2.5-cent fare for intrastate traffic, effective simultaneously with the higher interstate fares. The decision carries authority for making the interstate fares effective upon 10 days notice by the publication of special tariff supplements with an expiration date 18 months after the effective date.

Report Reviews New Evidence

In general the majority report, which covers nine mimeographed sheets, is confined to a review of the evidence offered at last week's further hearing. It notes, among other things, that the applicant railroads, which are "in serious need of additional revenue," contend that the 2-cent coach fare "has not been a success." Evidence on the situation in the South, where but lines have been increasing their revenues while railroads, which increased fares last December, are losing business, is found to "leave us with considerable uncertainty as to how much of the bus revenue increase should be ascribed" to diversions from the rail lines.

The carriers' complaint about the present spread between the Pullman and coach fares is noted, as well as their criticism of the formula whereby the commission in the earlier decision calculated that the 1937 coach service of the Eastern roads was operated at a profit.

(*Continued on page 41*)

Materials Testing Group Meets at Atlantic City

Program of the forty-first annual meeting of the A. S. T. M. contained many reports and papers of interest to the railroads

TESTIFYING to the growing importance of materials testing and control in industry, the forty-first annual meeting of the American Society for Testing Materials, which was held at Atlantic City, N. J., on June 27-July 1, inclusive, was the most largely attended meeting that this society has ever held at this point. With a total registration of 1,138 members and guests it was, moreover, the third largest convention ever held by this organization, the all-time high in attendance (1,525) having been reached at the 1937 meeting at New York.

As the program consisted largely of the presentation of technical papers and reports dealing with the specification, testing, analysis and standardization of engineering materials, it contained much that was of direct interest to the railroads. Altogether 104 individual papers and reports were presented before 17 general sessions of the meeting. In accordance with the usual practice of this society, much of the activity had to do with the approval for reference to society letter ballot for formal adoption as standard of existing tentative specifications, and the approval of new tentative specifications. Also many revisions were approved in tentative standards and existing standards.

In general charge of the meeting this year was Dr. A. E. White, president of the society and director of the department of engineering research and professor of metallurgical engineering at the University of Michigan, who was assisted by C. L. Warwick, secretary-treasurer. All sessions were held at the Chalfonte-Haddon Hall hotels.

In the election of officers, T. G. Delbridge, manager of the research and development department, Atlantic Refining Company, was advanced from vice-president to president, and W. M. Barr, chief chemical and metallurgical engineer, Union Pacific, was elected vice-president. Atlantic City was chosen as the location of the 1939 annual meeting, which will be held on June 26-30, inclusive.

President's Address

In his address, entitled Organized Research, Mr. White presented a detailed analysis of the manner in which research is now conducted and extended credit for most of the activity in this field today to ten different groups, namely, individuals, corporations, associations, testing laboratories, government bureaus, councils, foundations, societies, research institutes and colleges and universities. Corporations, he added, are responsible for the major amount of industrial research in this country, and he warned that "no matter how large or small a corporation, it must look forward to supporting research work if it expects to continue long in the field in which it is at present engaged."

In discussing the place of the technical society in the research field, Mr. White pointed out that it has been the practice for nearly all of our national societies to sponsor research work to as great an extent as possible and asserted that the "life blood of any society of national importance is research activity. There would be little need for engineering societies, were their activities confined solely to social gatherings, however much we recognize and appreciate the importance of social contacts."

Concluding, he said: "The handwriting on the wall is clear. The findings of research are needed for our continued progress and prosperity. No field is an exception. Sponsorship of research, therefore, must and will be continued at an ever-accelerating rate. Such sponsorship must be in the fields of both fundamental and applied research. Without the former, little ultimate progress can take place in the latter. Without the latter, little benefit can result to mankind from the former. Every encouragement, therefore, should be given to those individuals and agencies engaged in research so that, through their achievement, research may contribute its share in restoring prosperity, improving standards of living, and adding to our store of cultural knowledge."

Steel and Other Ferrous Metals

Metals came in for a great deal of attention in committee reports and papers. In its report, the Committee on Steel reported considerable progress in the advancement of its standardization program. In addition to a proposed new specification for normalized quenched and tempered alloy steel forgings, this committee recommended the revision of four tentative standard specifications, the tentative revision of six standard specifications, the adoption of seven tentative standards as standard and the adoption as standard of tentative revisions of four standards. Practically all of these recommendations were approved.

Other committee reports and papers on metals dealt with cast iron, wrought iron, chilled iron, ferro-alloys, the corrosion of iron and steel, corrosion-resisting alloys of iron, and impact failure and testing. In its report, the Committee on Cast Iron, among other proposals, recommended the adoption as standard of tentative specifications for cast iron culvert pipe. This committee also announced the organization of a new committee on chilled and white iron castings and announced that separate sub-committees on pressure pipe and soil pipe will be organized.

The Committee on Wrought Iron proposed a revision of the standard specifications for welded wrought iron pipe, which it explains are necessary in order to correct errors which, through oversight, have appeared in the present and several previous issues of these standard specifications, and also recommended a minor revision in the tentative standard specifications for rolled wrought iron shapes and bars. Both recommendations were approved.

Another report dealing with wrought iron was that

of the Sectional Committee on Standardization of Dimensions and the Material of Wrought Iron and Wrought Steel Pipe Tubing. This committee approved the addition of three A. S. T. M. specifications to the American tentative standard for wrought iron and wrought steel pipe, and also announced its decision to recommend submission of the latter tentative standard to the American Standards Association for approval.

The basic metallurgy of chilled iron, its technique of production and its metallographic nature were among the subjects discussed in a paper on the Properties and Uses of Chilled Iron. Under a discussion of the uses of chilled iron, it was pointed out in this paper that "chilled railroad car wheels probably represent the largest tonnage of any single item manufactured from chilled iron." For the past ten years, more than two million wheels annually have been produced of chilled iron, representing a yearly tonnage of approximately 750,000 tons."

In the report of the Committee on Ferro-Alloys, revisions were recommended in the existing specifications for ferro-alloys in order to bring these specifications into closer agreement with commercial practice and requirements. These revisions were adopted. In the form of new tentative specifications, which are intended to replace the present standard specifications, the Committee on Corrosion of Iron and Steel obtained approval of an extensive revision of the standard specifications for zinc-coated (galvanized) iron or steel sheets. Iron-base alloys of the corrosion-resisting type were reported on by the Committee on Iron-Chromium, Iron-Chromium Nickel and Related Alloys. This committee recommended revision of the tentative specifications for corrosion-resisting chromium-nickel steels (sheet, strip and plate), and adoption as standard of tentative standard specifications for corrosion-resisting chromium steels (sheet, strip and plate) and of tentative standard specifications for high-strength corrosion-resisting chromium nickel steels (sheet and strip). All of these recommendations were approved.

Discussion of different aspects of the subject of impact failure and impact testing was undertaken by means of a symposium. Of special interest in this symposium was a paper on the use of the Charpy test as a method of evaluating toughness adjacent to welds. In this paper, the "weld-quench" test was recommended as a low-cost method for use in the development of additional steels of easy weldability, for checking heats of steel for weldability before rolling to welding plate size, or for matching heats of steel already in successful welding use.

Cement, Concrete and Aggregates

Three general sessions of the convention were devoted to the presentation of committee reports and papers dealing with cement, concrete, concrete aggregates and ceramic and masonry materials. Included in the report of the Committee on Concrete and Concrete Aggregates were proposals for the adoption of tentative standards involving a test method for the determination of the yield of concrete, a test for determining the soundness of aggregates by freezing and thawing and a method for the sieve analysis of fine and course aggregates. This committee also proposed the withdrawal of four standards and the adoption as standard of two tentative revisions of standards, one dealing with a method of making and storing compression test specimens in the field and the other involving the specification for ready-mixed concrete. These recommendations were approved.

Among other measures, the Committee on Cement recommended a complete revision of the tentative specifications and tests for masonry cement, deletions of the definitions in the standard specifications for Portland cement so that these specifications and those for high-early-strength Portland cement will be in agreement, and omission from the standard specifications for high-early-strength Portland cement of the requirement covering the fineness of the cement. It also proposed the adoption as standard of the tentative standard specification for the chemical analysis of Portland cement. These proposals were adopted.

That there is apparently no consistent relationship between the bond strength and the compressive strength of concrete comprised one of the observations presented in a paper dealing with factors influencing the bond between concrete and reinforcing steel. Test results presented in this paper demonstrate that bond strength is largely influenced by the homogeneity of the paste in contact with the bar and by volumetric changes within the paste surrounding the bar. It was also discovered that bond strength is affected by the type of cement, the character of the mix (whether rich or lean), the position of the bars (horizontal or vertical), the shape of the bars (round or square), freezing and thawing and wetting and drying, and by vibration or jigging.

In other papers on concrete, data were given to show the results of tests made to determine the affect of various factors in the shrinkage of concrete in the air; to determine the speed of testing on the properties of concrete; and to determine the affect on the physical properties of concrete of using a blend of Portland and natural cements. Another paper comprised a study of fine aggregate in freshly-mixed mortars and concretes and still another described a method of measuring Young's modulus of elasticity of a concrete or mortar specimen by determining its natural frequency of vibration.

During a session on ceramic and masonry materials, the Committee on Manufactured Masonry Units secured approval of three new tentative specifications for structural clay load-bearing wall tile, for concrete units for use in the construction of catch basins and manholes, and for sand-lime building brick, the latter to replace an existing standard. The Committee on Refractories, among other things, presented and obtained approval of new tentative methods of test for the size, warpage and bulk specific gravity of refractory brick, and also a test for the true specific gravity of burned refractory materials. Another feature of the same session was a paper which reported the affect, on the resultant disintegration of certain selected samples of brick, of certain variations in the method of making freezing and thawing tests.

Various problems arising through the use of water in industry were discussed in a number of committee reports and papers that were presented during a session on water. In one of these, it was reported that a method for testing samples of boiler water, whereby embrittlement is produced in a sample of steel, has been devised. This method of testing simulates boiler operation and is said to eliminate a number of assumptions that it has been necessary to make heretofore. As a result of tests made on a large number of boiler water samples, it has been concluded that the presence of sodium chloride aids sodium sulfate in preventing embrittlement at boiler pressures up to 350 lb. per sq. in. and that at steam pressures above 350 lb. sodium sulfate has practically no inhibiting action. In the latter range, however, small amounts of aluminate were found to be effective.

The removal of dissolved salts from water through the use of "exchange filters" comprised the subject of another paper presented during the session on water. By means of this method, which is of relatively recent development, practically complete removal of dissolved

salts from water is effected by passing the water through two filter beds arranged in series. In the first bed, known as the "cation exchanger bed" the positive ions, or cations, are removed, such as those of calcium, magnesium and sodium, while the second bed, referred to as the "anion exchanger bed," removes the negative ions, or anions, such as the chlorides, sulfates and nitrates. The carbonate ions in the carbonates and bicarbonates of the raw water are not removed in either bed but are released by aeration after the water has passed through the system. Following a discussion of the different types of exchange bodies that may be used in the filters, the paper concludes that, by the proper combination of such materials, "a great improvement may be obtained over the zeolite method of treating water, particularly for boiler feedwater purposes."

Other features of the session on water included a paper describing an indirect method of determining the amount of sodium in water supplies, and two committee reports, namely those of the Joint Committee on Boiler Feedwater Studies and of the Committee on Water for Industrial Uses. The latter presented the first standards to be recommended by this committee, which included seven complete methods for the analysis of industrial waters.

Bituminous Materials and Soils

In a session dealing with bituminous materials and soils, the Committee on Bituminous Waterproofing and Roofing Materials secured approval of a new tentative specification for asphalt mastic for use in waterproofing and of a revision of the tentative standard specifications covering the use of coal-tar pitch for roofing, dampproofing and waterproofing. During this session the Committee on Soils recommended the revision of seven tentative standards, including the tests for the liquid limit of soils, for the field moisture equivalent of soils and for the shrinkage factors for soils. These recommendations were approved.

Other committee reports presented that are of direct or indirect interest to the railroads include those on coal and coke; the classification of coals; paints and other protective coatings, and timber. The committee handling the latter subject, of which Dr. Hermann von Schrenk is chairman, submitted a revision of the tentative method of test for tar acids in creosote and creosote-coal tar solutions, and also recommended that the tentative specifications for zinc chloride be continued as such for another year. Both proposals were approved.

Eastern Roads Get 2.5-Cent Coach Fare

(*Continued from page 38*)

Also, the lack of evidence "by or on behalf of the traveling public." The New York-Newark fare, with respect to which the New Jersey Board of Public Utility Commissioners made a presentation, was found to set up "no unusual circumstances which would warrant us in according to it exceptional treatment."

Commissioner Porter's Dissent

Commissioner Porter, in his dissenting opinion, followed through from his above-mentioned assertion to observe that "At a time when the country has seen the most precipitous decline in business in its history, and to an extremely low level, when the carriers are confronted by the intense competition afforded by 25,000,000 private automobiles, 44,000 buses, and with constantly increasing traffic by air, they seek to raise their passenger fares in coaches 25 per cent." Pointing out that no other industry pursues a price-raising policy under such conditions, Mr. Porter suggests—though he doubts it—that the railroads may be "immune from ordinary economic laws."

He conceded that it might be argued that the commission should not seek to stay the railroads, "bent on committing suicide"; but he still believes that the regulatory body owes "a duty to the public."

In the judgment of the dissenting commissioner the further hearing produced "not a single new fact" which would warrant a change in the opinions expressed in the 1936 fare-cut decision and in last April's decision in the present case. He went on to review the history of passenger-traffic developments in the 'Twenties when the Eastern roads "sat quiescently by while their passengers were gradually drifting to other means of transportation;" and to survey results following the 1936 fare cut in the East and the December, 1937, boost in the South. "Very clearly," Mr. Porter concluded, "the increased coach fare in the South has been a failure, and I can not bring myself to believe, general economic conditions being what they are, that the results will be any different in the East."

But Chairman Jesse H. Jones of the Reconstruction Finance Corporation, at his July 6 press conference, expressed the view that the coach-fare increase would benefit the Eastern roads.

* * * *

Dump Car of 50-Tons Capacity Built by the Pressed Steel Car Company for the Great Northern

One of the D. & R. G. W.'s Single-Expansion Articulated Locomotives Built by Baldwin

Ten Articulated Locomotives for the D. & R. G. W.

High capacity, single-expansion units built by Baldwin for fast freight service have tractive force of 105,000 lb. and weigh 321 tons

DURING the last two months ten 4-6-6-4 type single-expansion, articulated locomotives, designed for fast freight service, have been delivered to the Denver & Rio Grande Western. These locomotives are the first of this wheel arrangement to be placed in service on that road. They were built by the Baldwin Locomotive Works and are designed for service on grades up to three per cent and operating curves of 16 deg. The design, however, is laid out for a 22-deg. curve. In spite of their size these locomotives have a rigid wheel base of only 12 ft. 2 in., thereby providing greater flexibility than many smaller units. The driving-wheel diameter is 70 in. and the rated tractive force is 105,000 lb.

The Boiler

The boilers on these locomotives are of especial interest because of their size, having an overall length of 61 ft. 6½ in. They are designed to burn coal and have a straight-top taper-bottom barrel of four courses, including the combustion-chamber course. The steam dome is located on the course ahead of the combustion chamber. The outside diameter of the first ring behind the smokebox is 94½ in. and the outside diameter of the combustion-chamber course is 102 in., the slope in the bottom of the boiler being in the second course in order to provide sufficient water space under the combustion chamber.

The boiler shell is made of silicon-manganese steel, this material also being used for the outside wrapper and outside side sheets, shell liners and welt strips. The horizontal seams are butt joints multiple-riveted with inside and outside welts. The combustion chamber has a height of 67⅛ in. on the center line and is 109½ in. long.

The firebox has a grate area of 136.5 sq. ft. and is 224¼ in. long by 108¼ in. wide. Rosebud (pin-hole) type grates are used. The firebox crown, side and back sheets are ⅜ in. thick and the crown and sides are in three sheets. All of the seams in the inside firebox are electric welded, except the door sheet.

The length of the grates is 182 in. and at the front end of the grate is a transverse fire-brick wall. In front of this wall there is a cinder hopper, in the space between the wall and the front of the firebox. The firebox contains two Thermic syphons which support the brick arch. There is a third Thermic syphon on the center line of the combustion chamber. An extensive application of flexible stays is embodied in the firebox and combustion chamber, this type of staybolt being applied as a complete installation in the throat sheet and combustion chamber, in the two outside rows on the back head, and in the breaking zone of the side sheets. Across the front end of the crown sheet there are four rows of expansion stays. The staybolt installation on the firebox and combustion chamber includes 72 expansion stays, 158 radials and 1,923 flexible stays. All flexible sleeves are welded to the sheets.

The grate is divided into three longitudinal sections, with three shaker bars to each section. Coal is distributed to the grates by a Standard modified Type B stoker having seven control valves. The stoker engine is located on the tender. The ash pan is of steel-plate construction and has two large hoppers with air-operated slides.

The boilers are fitted with 61 2¼-in. tubes and 238 3½-in. flues. The length over the tube sheets is 22 ft. Tubes and flues are welded to the back tube sheet.

The boilers are equipped with Type E superheaters with Tangential steam dryers. Saturated steam passes

through a 12-in. steel drypipe to the superheater header. The steam flow to the cylinders is controlled by an American multiple type front-end throttle. The boilers are equipped with the Elesco feedwater heater on nine of the locomotives and the Worthington heater on one locomotive. The Elesco heaters are located on the front of the smoke-box, above the air compressors, with the feedwater pump on the left side of the locomotive. In the case of the Worthington heater, it is placed in the top of the smokebox ahead of the stack, with the cold-water pump on the left side close to the tender and the hot-water pump on the smokebox front below the door. Each locomotive is equipped with one Hancock non-lifting, Type K-NL injector of 12,000 gallons capacity. The injector is located on the right side.

Engine Beds and Machinery

Each of the two separate units of these locomotives has its own one-piece bed casting furnished by the General Steel Castings Corporation, in which the cylinders are cast as an integral part. They are fitted with articulated hinge connections equipped with the Cardwell-Westinghouse friction draft gear to permit movement between the units of about 1 in. in a longitudinal direction.

The cylinders, four in number, are 23 in. bore by 32 in. stroke and are 90 in. between centers. The cylinder barrels are strengthened by a continuous rib 1½ in. wide between the front and back stud flanges which also serves as a jacking strip. The steam distribution is effected by a 14-in. piston valve actuated by the Walschaert valve gear. The cylinder and valve bushings and valve packing rings are of Hunt-Spiller gun iron. The cylinder cocks, cylinder drain valves and cylinder-cock operating valves are of Okadee design. The cylinder heads are of cast steel. The piston heads are of nickel cast steel fitted with packing rings of copper-tin bronze. The piston rods are 5 in. in diameter, of carbon steel.

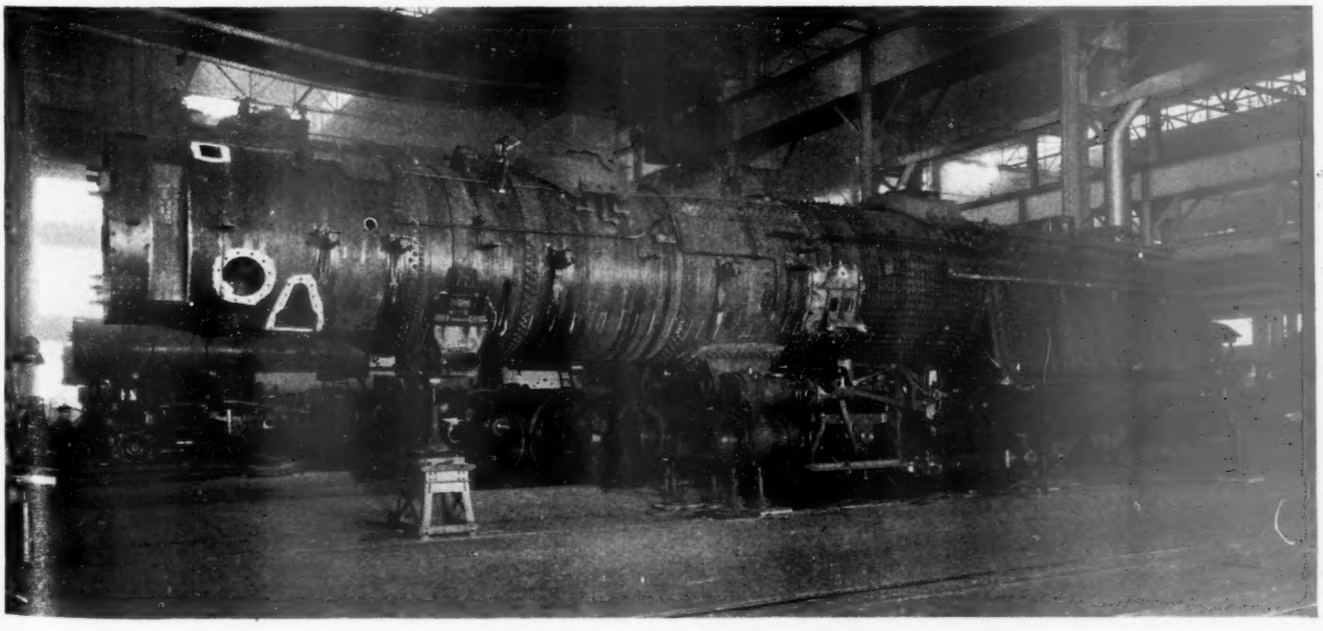
The guides are of the multiple-bearing type with the Alco Slidguide connection to the back cylinder head.

These locomotives are equipped with an arrangement for providing variable lead similar to that applied to a group of 4-8-4 type locomotives* built for the D. & R. G. W. in 1929. The front end of the radius rod is fixed to a block which moves vertically in a slide in the upper end of the combination level. This block is suspended from a bell crank connected to the reverse shaft by a reach rod. The movement of this block effects a change in the length of the combination lever so that the lead may be increased from zero in full gear to ⅜ in. at 25 per cent cut-off.

The maximum valve travel is 7¼ in. The valve gear

Front End View Showing Location of Feedwater Heater and Air Compressors

* Described on page 457 of the August 24, 1929, issue of the *Railway Age*.



The Boiler and Rear Engine Unit During Erection

is controlled by two Baldwin Type C power reverse gears, one for the front unit located on a bracket cast on the bed and another for the rear unit supported on the boiler. Synchronous control of the two valve gears is effected by means of a connection between the reverse shaft on the rear unit and the floating lever of the reverse gear operating the forward valve motion, this action being fitted with two universal joints and one slip joint which permit it to accommodate itself to the swing of the front unit when negotiating curves. By means of this arrangement identical cut-offs on both front and rear units are possible. This arrangement for controlling the valve gears is covered by patent application. In order to effect the most economical handling of the locomotive Valve Pilot has been applied.

The driving-wheel centers on these locomotives are 63 in. diameter and are the Baldwin cast-steel disc type. The material in the driving-wheel centers is special high-tensile steel. The diameter of the drivers, outside the tires is 70 in. All of the driving-wheel tires are flanged. The driving axles are of hammered carbon steel and are equipped with SKF roller bearings. The total lateral allowed on driving boxes is 3/16 in. Forty per cent of the reciprocating weight is balanced and the main wheels are cross balanced. The main and side rods and crank pins are of carbon steel. The main rods are connected to the third pair of wheels on each unit and all crank pins are fitted with floating bushings.

The front engine truck, furnished by the General Steel Castings Corporation, is designed for a truck swing of 6 in. each side of the center line. The engine-truck axles are fitted with A. S. F. roller-bearing units. The rear truck is of the Delta type and is also fitted with A. S. F. roller-bearing units. It is designed to swing 8½ in. on each side of the center line at the rear wheel. The lateral allowed on the engine-truck-wheel bearings is 3/16 in. total. At the front bearing of the rear truck 3/8 in. total lateral is allowed and at the rear wheels, ¼ in.

The couplers at the front end of the engine and at the rear of the tender are Type E furnished by the National Malleable and Steel Castings Company. A Franklin friction radial buffer is used between the engine and tender, together with the Unit Safety drawbar.

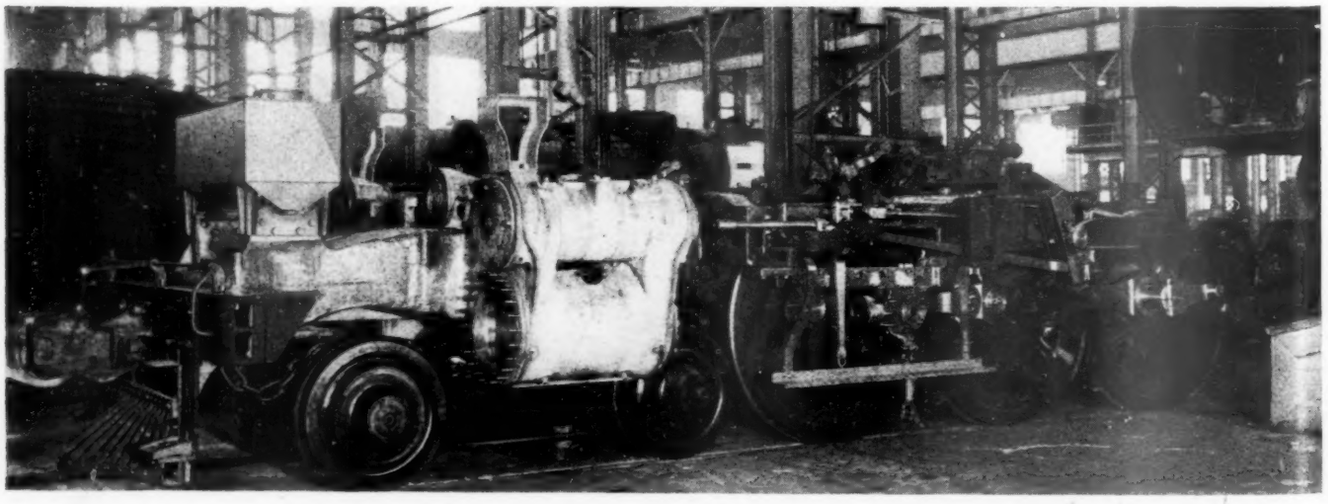
The cab is of the vestibule type, of steel plate with all seams welded; it is lined with wood. Polished plate glass is used throughout the windows. The front and back windows, through which the crew is required to look, are 3/16 in. thick and the others are ⅛ in. thick.

The Westinghouse No. 8ET air-brake equipment is used on all driving and tender wheels. The American Brake Company's foundation brake is used on the drivers. Two 8½-in. cross-compound air compressors are mounted on the smokebox front. The main and auxiliary reservoirs, cast in the rear engine bed, have a combined capacity of 29,000 cu. in. and two additional reservoirs under the left running board provide an additional 72,600 cu. in., making a total of 101,600 cu. in. reservoir capacity. The Le Chatelier water brake, used on the D. & R. G. W., is also applied to these locomotives. The headlight equipment on five of the locomotives was furnished by Pyle-National and on the remaining five by Sunbeam. Each engine unit has a sandbox with 20 cu. ft. capacity and the sand is distributed by Graham-

(*Continued on page 70*)

General Dimensions and Weights of the D. & R. G. W. 4-6-6-4 Type Locomotives

Railroad	D. & R. G. W.
Builder	Baldwin
Type of locomotive	4-6-6-4
Road class	L 105
Road numbers	3700-3709
Date built	April, 1938
Service	Freight
Rated tractive force, engine, 85 per cent, lb.	105,000
Weights in working order, lb.:	
On drivers	437,939
On front truck	84,550
On trailing truck	119,411
Total engine	641,900
Tender	394,000
Wheel bases, ft. and in.:	
Driving	35-6
Engine, total	61-6
Engine and tender, total	108-0
Driving wheels, diameter outside tires, in.	70
Cylinders, number, diameter and stroke, in.	4-23x32
Valve gear type	Walschaert
Valves, piston type, size, in.	14
Maximum travel, in.	7¼
Boiler:	
Steam pressure, lb.	255
Diameter, first ring, inside, in.	92¾
Firebox length, in.	224¼
Firebox width, in.	108¼
Combustion chamber length, in.	109½
Thermic syphons, no.	3
Tubes, number and diameter, in.	61-2¼
Flues, number and diameter, in.	238-3½
Length over tube sheets, ft. and in.	22-0
Fuel	Coal
Stoker	Standard Mod. B
Grate area, sq. ft.	136.5
Heating surfaces, sq. ft.:	
Firebox and comb. chamber	613
Syphons	165
Tubes and flues	5,563
Evaporative, total	6,341
Superheating	2,628
Tender:	
Style	Rectangular
Water capacity, gal.	20,000
Fuel capacity, tons	26
Trucks	Six-wheel



The Front Engine Unit in the Erecting Shop Before Being Placed Under the Boiler

J. W. Burnett
Chairman

Impressive record of constructive work done in spite of adverse conditions during the past year is shown in 12 reports of standing and special committees

F. W. Hankins
Chairman-Elect

Mechanical Division Reports Presented at General Committee Meeting

W. H. Flynn
Vice-Chairman Elect

INSTEAD of the usual annual meeting held in June each year by the Association of American Railroads, Mechanical Division, the meeting this year was confined to a one-day session attended only by members of the General Committee, committee chairmen and chairmen of important subcommittees. A total of 12 reports was received on the following subjects: Prices, Tank Cars, Loading Rules, Wheels, Brakes and Brake Equipment, Locomotive Construction, Arbitration, Couplers and Draft Gears, Underwriter's Laboratory Tests, Car Construction, Specifications, and Further Development of the Reciprocating Steam Locomotive.

One of the new reports presented this year was that by the subcommittee on Underwriter's Laboratories Tentative Outline for Inspection and Labeling of Self-Propelled Railroad Equipment Utilizing Internal Combustion Engines. The regulations submitted for the safe handling of liquefied petroleum gas if adopted as standard practice promise to promote maximum safety with this fuel which is now becoming widely used for internal combustion engines, car lighting in coaches, heating in refrigerator cars, cooking in diners, etc.

After hearing and acting on the committee reports, the General Committee listened to two important progress reports* on the passenger-car axle tests being conducted at the Timken research laboratory, and on failures of locomotive driving axles and crank pins, presented by W. I. Cantley, mechanical engineer, Association of American Railroads, Mechanical Division.

For the first time new officers and members of the General Committee, to succeed those whose terms expire this year, have been elected by letter-ballot vote. The results of the election were published in the July 2 issue of the *Railway Age*, page 21. Without exception the retiring members of the board were re-elected. J. W. Burnett, the retiring chairman, was elected to fill out the unexpired term of W. H. Flynn, the vice-chairman elect.

* For reviews of these two reports see *Railway Age*, July 2, 1938, page 18.

Report on Locomotive Construction

Exhaust Steam Injectors

During the year 1937, 59 locomotives were equipped with exhaust steam injectors and 25 locomotives on order for 1938 are also to be equipped. The steam pressures carried, or to be carried, by these locomotives ranged from 205 lb. to 300 lb. Fourteen of the locomotives being built during 1937 were equipped with turbo injectors. Twenty-two of the locomotives built during the year 1936 were equipped with exhaust-steam injectors, five of which were turbo injectors.

Advantages and Disadvantages of Higher Boiler Pressures

There has not been a sufficient number of locomotives in service with pressures above 300 lb. per sq. in. a long enough time

O. A. Garber

F. R. Mays

John Purcell

Below:

R. G. Henley (Left)

A. L. Ralston (Right)

to develop their full operating efficiency and to get comparative cost of their maintenance expense. This is particularly true at present because of the reduced business being done by the railroads with less locomotive miles being made, and no additional information is available from the various roads over that contained in last year's report. However, the fact that additional locomotives are being built at the present time with over 300 lb. boiler pressure indicates the trend is still upward as regards this feature.

The boiler should be as large as possible so as to have available the necessary reserve capacity to keep the heavy tonnage trains moving at the prescribed speed under all conditions.

One important thing necessary to obtain the full benefit of high pressure is a steam distribution valve which can be made to cut off at a low percentage of the stroke, and some progress is being made in this direction now by the use of the double-ported valve, also the poppet valve, though much remains to be accomplished with the latter.

The committee recommends that this be accepted as a progress report and the committee continued, to report again next year.

Development and Use of Oil-Electric Locomotives

Your committee has continued investigations of principal developments and has analyzed available data and statements submitted showing the number of Diesel locomotives in service in the United States and Canada, including new installations for the year 1937 and those units on order as of March 1, 1938. The information has been assembled through the assistance and records of various manufacturers as well as operating companies.

This study indicates that in 1937 a total of 155 locomotive units were placed in service. There was greater progress in the development and installation of new units of Diesel equipment than in any previous year. During this same period there were three 3,600-hp. and two 5,400-hp. units placed in service. The 5,400-hp. units are the first of this capacity and, prior to 1937, there was only one 3,600-hp. unit in service. There are on order, as of March 1, 1938, four additional 3,600-hp. units. The trend towards larger capacities is indicated by six 1,800-hp. units on order as of March 1, 1938. Units of 600 hp. capacity still seem to predominate the field for switching locomotives, 87 locomotives of this capacity being installed during 1937, with 30 additional on order as of March 1, 1938. The next greatest demand was for 900-hp. units, 42 of which were installed during 1937, with 7 more on order as of March 1, 1938.

It is also noted that there were seven installations of Diesel

Assignment of Diesel Locomotives in Service as of December 31, 1937, by Class of Service

Hp. Less than	Switch.	Transfer	Road freight	Road passenger	Grand total
300	13	..	..	..	13
300	96[1]	1	..	..	97
310	1	..	..	..	1
400	6	..	..	..	6
460	3	..	..	..	3
500	..	1	..	..	1
530	7[2]	..	..	..	7
550	1	..	..	..	1
600	168[3]	1	1	1	171
660	5	..	..	..	5
750	..	..	1	..	1
800	6[3]	..	..	1	7
900	43	..	..	..	43
950	..	..	..	1	1
1,000	4	..	..	..	4
1,200	..	..	..	6	6
1,330	..	..	..	2[4]	2
1,600	1	..	..	..	1
1,800	..	2	..	3	5
2,000	..	1	..	..	1
2,100	..	..	..	1	1
2,400	..	..	..	4	4
3,000	..	..	..	2	2
3,600	..	..	..	4	4
5,400	..	..	..	2	2
Total	354	6	2	27	389

[1] 38 units used in combination switch and transfer of passenger equipment.
[2] One unit in combination switch and road freight service.
[3] Two 600-hp. and three 800-hp. units used in combination switch and transfer service.
[4] Used single in passenger service and in combination with freight service.

locomotives with less than 300 hp. during the year, while prior to 1937 there had only been six such installations, which indicates that this type of equipment is being adapted to more general service and this helps to account for the fact that of the 389 units in service as of January 1, 1938, 155 or 40 per cent were placed in service during the year 1937.

The table shows the assignment of Diesel locomotives by class of service and the preponderance of these units still remains in switching service, with the addition of 143 units to the 210 so reported in 1936, although many of the units of 600 hp. and greater are reported as used in combination switch and transfer service. There has been a marked increase in the number of Diesel engines used in road passenger service. Units so reported were increased to 27 from 16, an increase of 69 per cent.

Attempt has been made to compile comparative operating statistics designed to indicate the availability of these units, lubricating and fuel oil consumption and cost of repairs, separated between electrical equipment and Diesel equipment, and the total cost of repairs per locomotive hour operated, and while the committee hopes to be able to assemble some interesting information along the above lines for future reference and comparison with cost of maintenance and fuel and lubrication costs for steam locomotives, to date this has not been completed.

It is the recommendation of the committee that the association adopt a uniform report from which such information can be readily assembled.

Design of Fundamental Parts of Locomotives

The sub-committee dealing with the design of fundamental parts of locomotives reported on three subjects.

Driving-Wheel Centers with Thin Wall Sections

This year the committee discontinued the statement giving details of the application of the various types of driving-wheel centers with thin wall sections, since they are now being used almost universally. The answers to a questionnaire, to which ten roads replied, indicates that only three centers, on two roads, were rejected because of defects showing up when new centers were machined, but that all except three of the roads have experienced some cracking of the castings after periods of service, usually, but not always, between the crank-pin and axle hubs. Some of these wheels were of early designs which have later been improved. Some were put back in service after welding; others were replaced by new castings.

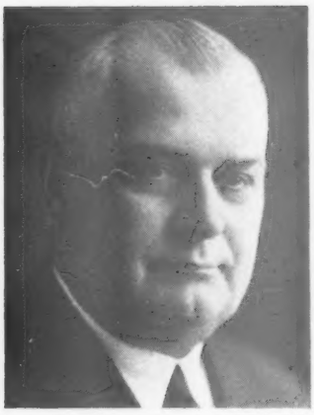
The American Locomotive Company reports rejections of the thin-wall-type wheel centers amounting to 10¼ per cent, March, 1937, to March, 1938, and rejections of 20 per cent of the spoke-type wheel centers used during the same period. Baldwin reports shrinkage cavities in the ribs separating counterbalance pockets in open-face counterbalances, and the development of cracks in the hubs and counterbalance walls (not the open-face type) of some wheels after a year's service.

Only two of the roads replying report the new wheel centers out of round after service. The other roads report no occasion to true up centers, and most of them report no tests to determine roundness. The Missouri Pacific reported one main wheel from a 2-10-2 type locomotive which checked 1/32 in. out of round after two years' service. The Chesapeake & Ohio reported a maximum out-of-roundness of ⅛ in. on several wheels checked after service. Several wheels on this road of an early design, since changed by the manufacturer, were found to be dished out as much as ¼ in. after service.

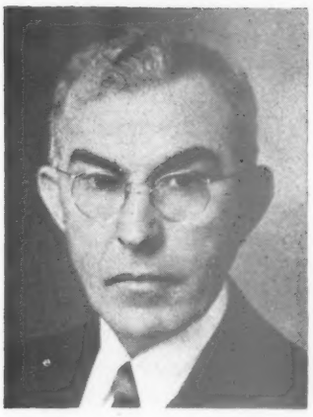
The Chicago & North Western, with service up to 300,000 miles, finds the wheels satisfactory and much less dishing of these centers due to tire-shrinkage pressure. The Missouri Pacific and the Illinois Central both comment on the better counterbalance obtainable. The Missouri Pacific was able to increase the speed of 14 2-10-2 type locomotives from 35 m.p.h. to 55 m.p.h. without track damage after the new type centers were applied on the main axles.

Furnace or Firebox Support and Boiler Waist Sheets

The General Steel Castings Corporation is making some tests on a locomotive bed of a 4-8-4 type locomotive now being built



Above:
D. S. Ellis (Left)
E. B. Hall (Right)



J. A. Power

H. B. Bowen

V. R. Hawthorne
Secretary

by the Baldwin Locomotive Works. These tests are to be made in such a manner as to determine, if possible, the value of waist sheets between boiler and engine bed at various points and under different conditions of service as well as when locomotives are lifted in the erecting shop. A copy of the report on the tests will be furnished to the committee when they have all been completed.

Screw Threads

The A. A. R. standard for screw threads is the U. S. Standard, and is described and illustrated on page L-27 of the Manual, no provision being made, however, for different classes of fits or tolerances.

The American Standards Association has approved and issued an American Standard for screw threads which is identical with the A. A. R. standard in form of thread, but provides for four classes of fit to suit various requirements. It is, therefore, recommended that page L-27 of the Manual be revised by the addition of a paragraph reading as follows: "When necessary or desirable to specify a particular class of fit, reference should be made to American Standards Association Standard for Screw Threads B 1.1-1935."

Roller Bearings for Locomotives and Tenders

This report covers steam and electric locomotives, but does not include Diesel-electric or high-speed streamline trains. Replies to questionnaire were received from 126 roads, 91 of which reported having no roller-bearing applications and 35 roads reported on applications. During the year ended December 1, 1937, new applications of roller bearings were made as follows:

	Existing road locomotives	New road locomotives	Total road locomotives
Engine truck	34	67	101
Drivers	6	52	58
Trailer truck	3	42	45
Tender truck	10	27	37
Total road locomotives built during 1937			325

From the reports as of December 1, 1937, the following number of locomotives and tenders are in service with roller bearings:

On	No. locomotives
Engine truck	689
Drivers	280
Trailer truck	149
Tender trucks	578

Failures of roller bearings on drivers and on engine, trailer and tender trucks were comparatively few and resulted mainly from broken or worn retaining cages, broken or loose sleeves, shelled races and rollers, and broken races and rollers. Roller bearings which have failed are being replaced, in some cases, with bearings in kind and, in others, heavier cages or bearings with heavier rollers are being applied.

The following mileages between date of application and date of failure of roller bearings are reported by some of the roads:

	Minimum	Maximum
Engine trucks	174,098	317,913
Drivers	301,678	319,675
Trailer trucks	263,000	546,974
Tender trucks	169,903	682,061

One road reported a failure of roller bearings on drivers at 17,608 miles and another road at 22,573 miles.

While sufficient information was not received to determine the total mileage made to date by locomotives equipped with roller bearings, some of the roads reported the following maximum mileages being made without a roller-bearing failure:

Engine truck	736,682
Drivers	346,994
Trailer truck	637,848
Tender truck	345,240

No trailer-truck or tender-truck axles have failed during the year ended December 1, 1937, but one road reported removing some main driving axles for inspection after making 124,000 to 155,000 miles and detected incipient cracks at intervals around the axle just within wheel fit. Replacement axles having a slightly different chemical composition will be applied for experimental purposes. Another reported removing some engine-truck axles that had made 120,000 miles because inspection revealed hair-line cracks and lines of demarcation around the journal where the race and collar come together.

Main and Side Rods
Valve Gears

New applications of roller bearings were made to main and side rods of three locomotives during the year ended December 1, 1937. The total applications which had been made as of that date are two locomotives on the main crank pin and five locomotives on all crank pins. Grease is used on the two locomotives having main-pin-bearing applications and oil on the five having main and side-rod bearings.

Very few failures occurred during the past year and their causes are attributed to failure of roller-bearing cages, rod slipping on the crosshead pin, and cracked crosshead. The total mileage as of December 1, 1937, by four of the locomotives was 513,808 miles.

Seventeen locomotives were equipped with roller bearings to various parts of the valve gear during the year ended December 1, 1937, making a total of 99 locomotives now in service as of that date. No failures were reported.

Size of Copper Flue Ferrules and Copper Tubing

The sub-committee prepared a questionnaire covering the present sizes of flue ferrules, to which replies were received from 35 representative railroads owning approximately 70 per cent of the total locomotive ownership of the Class I railroads in the United States and Canada. These replies were carefully tabulated and it was found that considerable differences existed with respect to size of flue ferrules used, there being a total of 251 different sizes in use.

Proposed standards were set up. These standards comprise a total of 48 different sizes of flue ferrules, there being 24 combinations of diameter and gage and two lengths for each diameter and gage.

From replies received from the representative roads to which the original questionnaire was sent, it is believed that these proposed standards can be adopted by the majority of the roads and *it is recommended that they be submitted to letter ballot.*

The subcommittee prepared a questionnaire covering the present sizes of copper tubing being used, to which replies were received from 35 representative railroads owning approximately 70 per cent of the total locomotive ownership of the Class I railroads in the United States and Canada. These replies were carefully tabulated and it was found that considerable difference existed with respect to the sizes of copper tubing used, there being a total of 152 variations in size and gage.

In consultation with the Copper and Brass Research Association proposed standards were set up. These proposed standards reduce the number of variations in size and gage from 152 to 26.

If these proposed standards are adopted and lived up to by the railroads, it will result in a considerable saving to the roads in the cost of copper tubing, *and it is recommended that they be submitted to letter ballot.*

Failures of Axles and Crank Pins

The subcommittee issued a questionnaire which was sent out by the Mechanical Division December 2, 1936, to 38 railroads in the United States and Canada requesting information covering the failures in service of axles and crank pins during the six-year period ended December 31, 1936. Replies to these questionnaires have been analyzed and results of this analysis are given in the progress report on failures of driving axles and crank pins on steam locomotives which has been prepared by the subcommittee and sent to the members. The committee feels that, if the members receiving copies of this progress report will analyze it very carefully, they may find therein information that will be helpful to them in reducing failures on axles and crank pins similar to those now being experienced.

Standardization of Rolled-Steel Engine-Truck-Wheels

From the information received in answer to a questionnaire, to which 118 railroads replied, the committee developed that

at the present time there are 142 designs of engine-truck wheels in use of various diameters from 26 in. to 37 in. It is felt that wheels of 30-in., 33-in. and 36-in. diameters can be proposed for new and existing locomotives. To meet the conditions on a number of existing locomotives another design of wheels of the same diameter is proposed. The latter design is not recommended for new locomotives and is to be used only until such time as the locomotives now requiring them are removed from service. The proposed designs, ten in number, will take care of approximately 93.5 per cent of the locomotives reported, either as the designs now stand, or with slight modification.

It is believed that these proposed standards can be adopted, and *it is recommended that they be submitted to letter ballot.*

Progress Reports

The subcommittee on Standardization of Valves reported progress on the design of globe and angle valves for superheated steam up to 400 lb. pressure and 700 deg. F. temperature. Progress reports were also presented by the subcommittees investigating the shelling of trailer tires, the subcommittee on the construction of locomotive boilers by the fusion-welding process, which is keeping in touch with the service developments of the D. & H. fusion-welded boiler, and by the sub-committee investigating the question of lateral on the front wheels of four-wheel trailing trucks, spring suspension and rail stresses. A joint subcommittee of the Committee on Couplers and Draft Gears and the Committee on Locomotive Construction has been appointed to consider draft gears for the rear of the tenders of passenger locomotives with a view to the improvement of the riding of passenger cars, particularly of the lightweight type under certain conditions when hauled by steam locomotives.

Other Subjects Considered

The sub-committee on Stresses in Locomotive Rods and Motion Work recommends holding in abeyance the formulation of a standard set of rules for determining stress allowances in alloy-steel rods and other motion work of light sections in view of the limited experience with parts of such design.

A subcommittee recommends that the proposed simplified-practice recommendations for machine, carriage and lag bolts submitted on August 20, 1937, by the National Bureau of Standards of the United States Department of Commerce be adopted as recommended practice of the association.

The report was signed by H. H. Lanning (chairman), mechanical engineer, Atchison, Topeka & Santa Fe; H. P. Allstrand (vice-chairman), principal assistant superintendent motive power and machinery, Chicago & North Western; G. McCormick, general superintendent motive power, Southern Pacific; W. F. Connal, mechanical engineer, Canadian National; J. E. Ennis, engineering assistant, New York Central; L. H. Kueck, chief mechanical engineer, Missouri Pacific Lines; J. B. Blackburn, mechanical assistant to chief mechanical officer, Chesapeake & Ohio; K. Cartwright, mechanical engineer, New York, New Haven & Hartford; Henry Yoerg, general superintendent motive power, Great Northern; G. C. Christy, superintendent motive power, Illinois Central; E. L. Bachman, general superintendent motive power, Pennsylvania, and W. R. Hedeman, engineer of tests, Baltimore & Ohio.

The report was approved and recommendations ordered submitted to letter ballot.

Steam Locomotive Development

Five meetings have been held since the appointment of your Committee on Further Development of the Reciprocating Steam Locomotive, at which all of the members have either been present in person or represented. The various phases of the work of the committee have been assigned to a number of small subcommittees, as follows: (1) technical, (2) cylinders and valves, (3) boilers, (4) design. These subcommittees have each held a number of meetings.

As a result of the study given the subject of a reciprocating steam locomotive to produce a sustained speed of 100 m. p. h. on straight level track with a 1,000-ton trailing load, the following definite specifications have been agreed to:

(1) 4,000 draw-bar horsepower, as required for a 1,000-ton trailing load at 100 m.p.h. sustained speed
(2) Cylinder hp. 6,400
(3) Four-cylinder engine
(4) Approximately 300 lb. boiler pressure—750 deg. F. steam temperature at the boiler
(5) Conventional radial-stay type boiler
(6) Factor of adhesion, 4.5 if possible
(7) Boiler to be able to supply 100 per cent cylinder demand plus steam demand for auxiliaries
(8) Calculations to be based on bituminous coal having 12,000 B.t.u.
(9) Design of locomotive to be of conventional type with provisions made for streamlining
(10) Driving-wheel arrangement to be 4-4 coupled
(11) Engine designed for maximum curvature of 18 deg.
(12) Driving-wheel diameter, 84 in. preferred
(13) Anti-friction journal bearings throughout

The committee will proceed on the above outlined fundamental basis in working up the recommended design and does not anticipate going into details only in so far as necessary to support its recommendations.

In its investigation of the problem of improving present designs of reciprocating steam locomotives, the committee has recognized the importance of conveying the steam from the boiler to the cylinders with the least possible loss of pressure and at this time suggests to the members of the Mechanical Division that the matter of steam passages from the throttle through the dry pipe, superheater steam pipe, cylinders, both live and exhaust passages, be carefully analyzed as this, in our opinion, holds promise of increased efficiency in the performance of many existing locomotives. Furthermore, the committee also suggests a closer study and policing of detail parts of existing locomotives.

Further recommendation for the particular problem in question, it is the committee's intention to study and analyze various detailed designs of the major component parts of locomotives, such as boilers, valves, valve gears, superheaters, machinery, counterbalance, etc., with the idea of submitting recommendations covering improvements in existing steam locomotives.

A special subcommittee of your committee observed actual road dynamometer tests on the 4-6-4 N. Y. C. locomotive and collected data, which will be supplemented by actual observations of road tests of the Santa Fe 4-8-4 locomotive at an early date. All of this data will be compared with the Pennsylvania Altoona test-plant data and Santa Fe 4-6-4 road test data now collected. Following the analysis of this test data, it is possible that some change may be recommended in the fundamentals mentioned in this report.

Your committee wishes to acknowledge the co-operation of the New York Central, Pennsylvania, and Atchison, Topeka & Santa Fe in making this information available.

Minority Report Submitted by J. E. Ennis

In dissenting from the majority report, J. E. Ennis, engineering assistant, New York Central, made the following statement:

The committee has assigned to itself, and up to the present time has devoted its sole attention to, the design of a reciprocating steam locomotive capable of hauling a train of 1,000 tons at a sustained speed of 100 m. p. h. on level tangent track.

To meet these conditions, the committee proposes a locomotive with four cylinders and four driving axles, to develop 4,000 hp. at the draw-bar and 6,400 cylinder hp. There are little test data to substantiate these horsepower requirements, and there are some data indicating that considerably less horsepower would be required at the cylinders.

There are in existence and available, locomotives with two cylinders and three pairs of driving wheels, which it is reasonably sure could either meet the assumed requirements or approach them very closely, and it is believed that the committee should have thoroughly explored the possibilities of these locomotives before committing itself to an experimental design of the type proposed. If none of these locomotives could fulfill the stated conditions, there is the practical certainty that a locomotive of proper design with two cylinders and four pairs of driving wheels would suffice, thus providing a locomotive of known conventional type, commonly acceptable to the railroads, which should be lower in first cost and cheaper to operate and maintain, than the very unusual design proposed by the committee.

The report was presented by Chairman D. S. Ellis, chief mechanical officer, Chesapeake & Ohio, Cleveland, Ohio; Vice-chairman W. I. Cantley, mechanical engineer, Association of American Railroads, Chicago; W. R. Hedeman, engineer of tests, Baltimore & Ohio, Baltimore, Md.; J. E. Ennis, engr. asst., New

York Central, New York; W. R. Elsey, mechanical engineer, Pennsylvania, Philadelphia, Pa.; J. M. Nicholson, mechanical supt., Atchison, Topeka & Santa Fe, Topeka, Kan.; Lawford H. Fry, railway engineer, Edgewater Steel Company, Pittsburgh, Pa.; W. E. Woodward, vice-president, Lima Locomotive Works, Inc., New York; H. Glaenzer, vice-president, Baldwin Locomotive Works, Philadelphia, Pa.; J. B. Ennis, vice-president, American Locomotive Company, New York; E. G. Bailey, vice-president, Babcock & Wilcox Company, New York; Edward C. Schmidt, professor of railway engineering, University of Illinois, Urbana, Ill.

(*The report was accepted as a progress report, the committee given a vote of thanks and assured of the whole-hearted support of the general committee in its further work. The committee was instructed to work up plans for testing the latest types of steam locomotives using a dynamometer car where necessary, and submit recommendations to the general committee. These tests are to include the latest type of four-cylinder locomotives now in service.*)

Report on Car Construction

Designs of Standard Cars

On January 25, 1938, a joint meeting was held of the full Car Construction Committee and the Freight Car Design Committee of the American Railway Car Institute for the purpose of making plans for economic study and development of lightweight car designs, in line with the program of 1932. It was agreed that the initial studies would be based on the box car having inside dimensions of 40 ft. 6 in. long, 10 ft. high at the eaves and 9 ft. 2 in. wide and that the types of construction to be developed under this further cooperative effort of the car builders, the railroads and the specialty manufacturers would be as follows: (a) improved and lightened design in carbon-steel riveted construction; (b) same as (a) except alloy steel with combination of welding and riveting; (c) alloy steel largely of welded construction; (d) combination of carbon steel riveted and welded construction. Some work has been performed but progress only can be reported at this time.

New House Type and Hopper Cars Ordered June 10, 1937, to May 4, 1938

Design	No. of cars	Per cent of total
A. A. R. throughout or conforming closely thereto, including lightweight alloy steel to A. A. R. base designs; house cars to the larger inside clear dimensions; box, except underframe with floating center sills, and hoppers with inside dimensions to meet specific conditions	8,640	87.63
Not A. A. R. except new standard center-sill section and 25¾-in. truck-center-plate height	1,175	11.92
Not A. A. R.	45	.45
Total	9,860	

After the box-car design is disposed of, it is planned to proceed with the automobile car of both 40 ft. 6 in. and 50 ft. 6 in. inside length and then later to take up the study of hopper cars.

Standard Refrigerator Car

In accordance with program as outlined in the 1937 report of the Construction, the development of a design for a standard refrigerator car for freight service has been proceeded with in cooperation with the A. R. C. I. and the Refrigerator Car Operators' Committee, resulting in formulation of specifications covering fundamentals of design as agreed upon by all concerned.

In view of studies now being made to effect further reductions in weight by the use of alloy steels and welded construction, it has been decided that it would not be advisable at this time to prepare a complete set of detail drawings covering the refrigerator car and that under the circumstances the matter would be properly protected by adherence to standard general dimensions and other basic features as covered by the specifications which are included as part of this report. *Recommended for letter ballot.*

General Dimensions of Proposed Standard Refrigerator Car

Nominal capacity	40 tons
Inside clear length between bunkers	33 ft. 2¾ in.
Inside width between lining	8 ft. 3 in.
Inside height, floor to ceiling	7 ft. 9 in.
Inside height, floor rack to ceiling, minimum	7 ft. 3 in.
Height of floor rack, maximum	0 ft. 6 in.
Clearance under floor rack slats, minimum	0 ft. 4¾ in.
Capacity of ice bunkers (263 cu. ft.), nominal	10,000 lb.
Width of side-door opening, minimum	4 ft. 0 in.
Height of side-door opening, minimum	6 ft. 6 in.
Height from rail to floor:	
Minimum	4 ft. 2 in.
Maximum	4 ft. 4 in.
Center-plate height	25¾ in.

Specifications

[The committee presented a complete specification covering materials, workmanship and character of the major details of construction. The general dimensions of the car are shown in the table. It is to be steel-sheathed and wood-lined, following as closely as practicable the A. A. R. steel-sheathed box-car design, or alternately, a steel-frame superstructure with wood sheathing and lining. The underframe is to conform to that of the 1932 A. A. R. steel-sheathed box car. Steel ends are specified and the solid-steel roof is to have heavier sheets around the hatch openings. Blanket type insulation is preferred, 3 in. thick in the sides and ends and 3½ in. thick in the floor and roof. The car is to be equipped with hinged sectional floor racks and the bunker bulkheads are to be insulated. Fillets in the corners of hatch openings are to have a radius of 1½ in. Nonharmonic truck springs are recommended for all new refrigerator cars.—Editor]

Report of Joint Sub-Committee on Side Frames and Bolsters

During the past year new designs of cast-steel side-frames successfully passed both static and dynamic tests, or slightly modified designs of side frames, already tested and approved, were approved for use in interchange service to the number of 16. These included two alloy-steel and four carbon-steel 40-ton spring-plankless designs, seven alloy-steel and two carbon-steel 50-ton spring-plankless designs, and one alloy-steel 70-ton design with spring planks. There were 13 new bolster designs which successfully passed static tests or slightly modified designs previously tested which were approved, including two alloy-steel and four carbon-steel 40-ton spring-plankless types, six alloy-steel 50-ton spring-plankless types, and one alloy-steel design for a 70-ton spring-plankless truck. The designs include the Barber stabilized trucks and self-aligning trucks.

Reference was made in the 1937 Report of Car Construction Committee to the new designs of pressed and welded rolled-steel frame and bolster for 50-ton capacity cars submitted for approval by the United States Steel Corporation. The bolster which successfully passed static tests conducted by the sub-committee was approved for use in interchange service to the extent of 50 car sets as referred to in the above mentioned report and was later increased to a maximum of 1000 car sets. The pressed and welded rolled-steel side frames successfully passed static test conducted by the joint sub-committee but as this frame has not yet passed the required dynamic test, approval has been withheld. Other applications pending include side frames for a 40-ton and a 70-ton truck, each spring-plankless and of carbon steel, and one 50-ton alloy-steel design for a truck with spring plank.

In the list of side-frame and bolster designs approved is included the Simplex truck manufactured by the American Steel Foundries who were given authority March 25, 1936, to furnish not to exceed a total of 562 car sets of 40-, 50-, or 70-ton capacity for experimental applications and the National Type C truck manufactured by the National Malleable and Steel Castings Company who were authorized Sept. 11, 1936, to furnish not to exceed 50 car sets of either 40-, or 50-ton capacity for experimental application. The list also includes 40-ton capacity, Grade B, carbon-steel quick-wheel-change trucks submitted by the Four-Wheel Truck Association which has been approved for experimental application to two John Morrell & Company and two Armour Car Line Cars. Included is also a spring-plankless

cast-steel side frame made from Grade B carbon steel submitted by the Unit Truck Corporation for approval for application to not more than 50 cars in interchange. This frame embodies a new departure in truck construction including a special type of one-piece brake beam engaging in a guide cast integral at the lower inside edge at truck side frame, thus doing away with the conventional brake-beam hangers and brackets.

Proposed Restrictions in Interchange of Older Types of Truck Side Frames

At a regular meeting of the Committee on Car Construction, recommendations were made to modify Interchange Rule 23 covering autogenous welding limits and regulations to prohibit welding of cracks and fractures and building up of worn surfaces on L- and T-section cast-steel side frames. Subsequently the General Committee concurred in this recommendation and in addition thereto, recommended the revision of Rule 3 Section (t) and of Rule 19 to prohibit the application of welded L- and T-section side frames to all cars in interchange, and this is to be included in the Arbitration Committee's report this year.

Ultimate Results

Although the above is a step in the right direction and should produce good effects, ultimate results will depend almost entirely on the extent to which the member roads interest themselves in the elimination from service of questionable side frames, irrespective of design, age or section, which obviously should not be continued in service. Some railroads have found it very desirable to institute reports of all defective cast-steel side frames found on system cars, with a view to discovering the patterns giving the most trouble and putting in force such rules as are necessary properly to safeguard operation.

Definitions and Designating Letters for Freight and Passenger Cars

During the past year the committee has passed upon a large number of requests from the members for designating letters for new types of passenger and freight cars. When such requests are received your sub-committee first reviews them, and in cases where it is found that designating letters already in the Manual cover the cars in question, the car owner is so notified by the secretary. A large number of such cases have been so handled this past year.

The committee recommends the following:

Changing of the definition PC to read:

"PC—Passenger, Parlor, or Chair Car. A car fitted with individual or movable chairs and having toilet and washroom facilities. May be equipped with bar. Sometimes provided with barber shop and bath."

The addition to the Manual of the designation *"LC—A house car with side doors and roof hatches. May be equipped with end doors."*

The committee has also passed favorably upon a number of cases of modifications of definitions of designating letters now in the Manual. The object of these suggested changes is to simplify the Manual and eliminate some of the designations which are superfluous. These latter recommendations are being reviewed by other interested divisions of the Association and will, at a later date, be submitted to the members for approval by letter ballot.

Interchange Rule 3 on New Designs of Freight Cars

During the current year the committee reviewed the following designs with trucks in accordance with the provisions of the first paragraph of Interchange Rule 3:

Light-weight steel-sheathed automobile car 50 ft. 6 in. long, with special design of underframe; 700 cars. Light-weight steel-sheathed box car 40 ft. 6 in. long, with special design of underframe; 1900 cars. Both for the Union Pacific; both approved.

70-ton side-dump hopper cars of copper-bearing steel for the Elgin, Joliet & Eastern. Center sills consist of two 13-in. 40-lb. channels with ⅜-in. by 21-in. cover plate.

American Car and Foundry Company underframes, anchorage and car structure parts for transportation of 15 one-ton chlorine containers each. Designs (2) approved; 9 cars.

Pullman-Standard Car Manufacturing Co light-weight steel-sheathed box car 40 ft. 6 in. long. Special all-welded design; 200 cars.

Journal Boxes and Details

The annual report for 1937 contained certain recommended changes in the width of the opening at the back end of the box as given in the table on Page 32 of D. V.-920.

Following a conference with the side-frame manufacturers, it now develops that minor corrections in some of these dimensions are considered necessary to prevent, under extreme worn conditions, the distortion of the back opening in the box and the possible crushing of the dust-guard sides.

It is recommended that these changes, which will provide sufficient clearance at the inner axle opening of the box with a minimum amount of change in patterns, be submitted to letter ballot. If approved, the drawings in the Manual and Supplement to the Manual will be revised accordingly.

Other Items

The committee called attention to the fact that the final report of the Impact and Live-Load Tests of Pullman-Standard Welded Box Car No. 501 has been completed, and that the secretary has been instructed to circulate it to all voting members as well as to the A. R. C. I.

Changes desired in the A. R. E. A. clearance diagram marked "Unrestricted for Main Lines" were made and approved by the A. R. E. A. at its last annual meeting and will be incorporated in its Manual as Fig. 10. This will also be included in the Supplement to the Mechanical Division Manual in addition to Plate B for "Unrestricted Interchange Operation" which is to be retained.

A sub-committee has been appointed to check the lettering and marking for auto rack cars with the members for the purpose of determining whether a changed system of classification which can be kept up to date more conveniently is not desirable.

The joint sub-committee to consider the adjustment of rail-load limit capacity to compensate for various weight wheels now in general use proposes the addition of a note to Interchange Rule 86 to compensate for the average difference in weights. This has been approved by the Arbitration Committee and will be considered by the Car Construction Committee at its next meeting.

The report was signed by P. W. Kiefer (chairman), chief engineer motive power and rolling stock, New York Central; T. P. Irving (vice-chairman), engineer car construction, Chesapeake & Ohio; W. A. Newman, chief mechanical engineer, Canadian Pacific; J. McMullen, superintendent car department, Erie; F. A. Isaacson, engineer car construction, Atchison, Topeka & Santa Fe; G. S. Goodwin, assistant to general superintendent motive power, Chicago, Rock Island & Pacific; H. L. Holland, assistant engineer, Baltimore & Ohio; E. B. Dailey, engineer car construction, Southern Pacific; J. T. Soderberg, general foreman, Pennsylvania; T. M. Cannon, engineer car construction, Chicago, Milwaukee, St. Paul & Pacific; H. E. Myers, master car builder, Lehigh Valley, and F. J. Jumper, general mechanical engineer, Union Pacific.

The report was approved and recommendations of the committee ordered submitted to letter ballot.

Report on Wheels

It has been suggested to the committee that tape sizes for cast-iron wheels be defined as 1/16 in. rather than ⅛ in. circumferential dimension in order that in the selection of wheels for physical tests, should the wheels of one designated tape size fail, advantage could be taken of the next tape dimension. This would provide for test groups to vary by one-half tape instead of full tape size.

The ⅛-in. tape dimension has been so long established and so generally recognized as a unit of wheel circumference meas-

ure that the committee does not approve changing the unit tape size of ⅛ in., but is agreeable to revising the section of the cast-iron wheel Specification M-403-36 so that advantage can be taken of half tape sizes in the selection of wheels for physical tests.

It is also recommended that in each of the paragraphs under consideration for revision that the words "and cast date" be added.

Out-of-Round Tolerances—New Cast-Iron Wheels

Consideration has been given to the question of reducing the out-of-round tolerance on new cast-iron wheels. The committee realizes the extent to which damage to equipment and lading occurs from out-of-round condition of wheels, but is not in position to make a recommendation at this time. Advice has come to the committee that certain roads are purchasing and placing in service ground cast-iron wheels and some roads are following the practice of grinding wheels after mounting, which the committee considers is a most desirable practice. Information from roads following these practices as to service results is earnestly solicited.

Your committee has been solicited to establish certain symbols to represent loading capacity of lightweight cast-iron wheels. The committee recognizes there may be some merit to such an arrangement should the lightweight cast-iron wheel be adopted as standard.

Authorization of Use of Experimental Cast-Iron Wheels

In the 1937 report attention was directed to an experimental type 750-lb. 33-in. single-plate cast-iron wheel, the special features of this wheel being the cored hub and brackets supporting the inside of the rim. Authority had been issued the manufacturers to construct as many as 10,000 of these wheels; the same to be identified as experimental design by the mark "AAR-X."

Further development on the part of the Association of Manufacturers of Chilled Car Wheels resulted in the production of a lightweight cast-iron wheel suitable for the same capacity loading as the 750-lb. wheel. This lightweight wheel was to weigh 695 lb. in the rough, 685 lb. finished. Request for the application of 10,000 of this design of wheel carrying with it cancellation of the authority for 10,000 750-lb. wheels, of which a balance of 7,600 remained unapplied, was granted by the General Committee, these wheels to carry the AAR-X experimental wheel marking.

Another request was received for authority to apply 10,000 cored-hub, bracketed-type wheels for mounting on 6-in. by 11-in. axles. Three thousand of these wheels were on order from a member road. In consideration of this request authority was granted for the 3,000 wheels on order, the subject being left open for consideration should additional groups of wheels of this capacity be requested by member roads.

In connection with these lightweight experimental cast-iron wheels, the committee feels that a careful study should be made of two conditions, relating to this design, namely, the effect the cored hub may have upon the finished machining of the bore of the wheel and the effect this partially unsupported wheel fit may have upon the concentration of stresses in the axle. Roads obtaining these cored-hub wheels should give careful consideration to the former item, and the Association of Manufacturers of Chilled Car Wheels should arrange to make a study of the latter, relating to axle stresses.

Chipping Customer's Initials Off Wheels

It has been the practice on the part of cast-iron wheel manufacturers to supply the demand for small groups of wheels from stock produced for larger customers by chipping the customer's initials from such wheels. While there is only an occasional demand on the part of the manufacturers that requires such action, the committee recommends that this practice be prohibited and when the manufacturer is required to supply wheels under the above mentioned condition that authority be requested of the railroad from whose stock these wheels are to be taken, permitting the railroad's initials to remain on the wheels and reporting to the road for whom they were manufactured the serial numbers of wheels included in such an allotment.

The Association of Manufacturers of Chilled Car Wheels has been doing some splendid research work in an effort to develop a definite and practical means of determining the depth of chill, proceeding along the line of hardness as an index to the character and depth of chill. It has also been demonstrated that the inspectors trained in the art of determining the character of chill in the wheel can very closely approximate in their determinations the results of the hardness test. This study is being continued on the part of the manufacturers and probably by the time another annual report is prepared some more detailed data will be available.

A joint committee selected from membership of the Engineering and Mechanical Divisions has been appointed to make a study as to the relationship between track and rolling stock. The representative on this joint committee from the Wheel Committee reports that one meeting has been held, but no definite program formulated. It is understood that this work is to be carried forward under the chairmanship of Dr. A. N. Talbot of the University of Illinois.

The subject of out-of-roundness has already been mentioned in connection with cast-iron wheel subjects, and it is no less important with respect to wrought-steel wheels as the same degree of out-of-roundness is just as destructive, regardless of the material of which the wheel is made.

In a conference with representatives of the wrought-steel wheel industry the suggestion was made to them that consideration be given to the practicability of reducing the out-of-round tolerance for one-wear and two-wear wrought-steel wheels from the present maximum of 1/32 in.

Design of Wheels for Streamline Trains

Your committee has been endeavoring to accumulate some definite data with the idea of determining the characteristics of car wheels best adapted to high-speed lightweight streamline trains. There is not sufficient data available to support any definite recommendations, but it may be of interest to know just what the tendencies in this service indicate.

The service mileage of wheels in this class of service is much lower than considered normal for ordinary passenger-car wheels. The performance of wheels indicates that in this particular class of service a special type of wheel must be provided if reasonable mileage is to be secured. It is hoped that your committee, in collaboration with the manufacturers, may, during the coming year, be able to suggest a specification for wheels for such high duty service.

In the study of wheel service it appears the question of braking conditions on these high-speed trains is a matter of worth while consideration by the Brake Committee in an effort to relieve as far as possible the punishment the wheels receive as a result of heavy braking.

In several former reports of the committee reference has been made to the loss of service metal in passenger-car wrought-steel wheels due to development of thermal checks, resulting from severe braking. On certain railroads in some classes of service this trouble is still prevalent. On certain other railroads where special types of wheels have been used to overcome the trouble, it appears to have been largely eliminated. The experience on these latter railroads seems to indicate that where service conditions are such as to make necessary a special type of wheel to resist thermal checking, the best solution is to use wheels with a lower carbon content in the steel and then heat treat to obtain the desired physical properties. The committee does not consider that a special specification is necessary to cover this product at the present time as its use may not be necessary in more than a limited number of special services. Where unusual difficulties of this kind are encountered the committee suggests a trial of special wheels of the above mentioned type which can be secured from any of the manufacturers of wrought-steel wheels.

Wheel Service Records

Appended to the 1937 report of this committee were certain service records reported by three member roads showing the cause for which wheels were removed on these roads during

three winter months. In presenting this portion of the report your committee stated it was the intention to supplement this record with a similar record of three summer months in a subsequent report. The roads supplying this information are the same roads included in last year's report and are similarly designated as Roads A, B and C. The arrangement of the data is substantially the same, except that two roads showed the results of removals of multiple-wear and one-wear wrought-steel wheels separately, whereas in last year's report the record of all wrought-steel wheels was combined.

On Road A the principal causes for removal of cast-iron wheels was worn-through chill, seams, brake burn cracks and broken rim. The percentage of the total number of wheels removed for these causes ranges from 18.58 per cent for worn-through chill, to 15.40 per cent on account of broken rim.

The principal cause for the removal of multiple-wear wheels on this same road was thin flange, 67.32 per cent having been removed for this cause, while for the one-wear wrought-steel wheels the principal cause of removal was built-up tread, 46.42 per cent, with an appreciable percentage for loose wheels and thin flange.

The most prominent causes for cast-steel wheel removals was shelled-tread and thin flange, 29.73 per cent having been removed for each one of these defects.

On Road B 32.8 per cent of the cast-iron wheels were removed on account of broken rim. The next condition in line of defects was 22.37 per cent removed on account of flat sliding. Of the wrought-steel wheels removed on this road 51.73 per cent were removed for thin flange, 23.87 per cent for high flange or tread-worn hollow. This item of 23.87 per cent represents a favorable condition as it indicates this group of wheels had been subjected to the maximum amount of tread wear.

On Road C, three prominent causes for removal of cast-iron wheels were, worn-through chill, broken rim and seams, these representing 32.53 per cent, 21.58 per cent and 13.22 per cent, respectively. On this same road the wrought-steel wheel removals were 38.10 per cent for worn flange, and 28.57 per cent for slid flat. It will be observed, however, that the number of wrought-steel wheels involved in making up these percentages is rather limited, and therefore does not represent much value from a service-record standpoint as where a greater number of wheels are involved.

Revision of Wheel and Axle Manual

In the revision of the Wheel and Axle Manual there are so many pages in which changes are involved that it was decided to reprint the manual, and it is hoped before the year is over the association will be in position to authorize this action being taken.

Observation of wheel-shop practices, as evidenced by wheels coming into the shops of committee members, indicates the need for more refined workmanship, and it is urged that member roads take occasion to look into the manner in which wheel and axle work is being performed.

The committee wishes to take this means of expressing its appreciation of the splendid co-operation it is receiving from the representative wheel manufacturing interests. The committee feels we are now in the midst of a period of wheel development brought about by the endeavor on the part of the manufacturers to meet various exacting service conditions, and realizing the importance of service demonstrations, solicits the patronage of the railroads so that opportunity may be afforded the manufacturers for developing the merits of their improved products.

Summary of Recommendations

Revision of Cast-Iron Wheel Specifications—It is recommended that the specifications for cast-iron wheels, M-403-36, be revised by inserting the underscored words *"full or half"* tape size *"and cast date,"* in paragraphs 5 (c), 6 (a), 7 (a), 8 and 11 (b).

It is recommended that the dimensions referred to in Sec. 4 (b), Dimensions—second sentence be changed to read: *"¼ in. above or 5/16 in. below."*

After the second sentence in Sec. 4 (c), Taping, insert *"A tape size is considered that of the lower gradation until the next higher gradation is reached."*

Par. 5 (b)—Drop Test—Change the word *"on"* a concrete foundation to *"or"* a concrete foundation.

Master Gages—In the design and development of master gages for condemning worn condition of gages used in connection with wheels it was necessary to establish a dimension to represent the result of wear beyond which dimension the gage would be condemned. Dimension 0.015 in. which corresponds to 1/64 in. was established as a basis for the development of these master gages.

The gages developed for this purpose are shown as Figs. 35 to 42 inclusive, and are presented for approval of the association. [Note: In order to avoid expense, prints of the gages referred to were omitted from this report. Cuts will be made for the Letter Ballot Circular.]

Symbols.—It is recommended that defect symbol 83-A be adopted to represent "Cast-Iron Wheels cast prior to January 1, 1921" (Rule 83).

Recommendations to Arbitration Committee with Reference to Changes in Interchange Rules

Rule 76—Tread Worn Hollow—Where the tread-worn hollow defect refers to cast-iron wheels, insert *"One Wear"* before cast-steel wheels.

Where the tread-worn hollow defect refers to wrought-steel wheels, after wrought-steel insert *"and Multiple-Wear Cast-Steel Wheels."*

If the aforegoing recommendation is approved, similar change should be made in P. C. Rule 7, Sec. (f), Par. 4, and the title under Fig. 91, page 126 of the Wheel and Axle Manual should be changed to read: *"Tread Worn Hollow Condemning Limit Gage for Cast-Iron and One-Wear Cast-Steel Wheels."*

Rule 75—Brake Burn Cracks—Insert a note establishing a definite dimensional limit for transverse cracks approaching the flange of the wheel.

A similar note should be added to P. C. Rule 7, Sec. (f), Par. 3.

Rule 73-A, Out-of-Round—Revise by inserting "One-Wear" before cast-steel and "One-Wear" before wrought-steel wheel references.

If the above recommendation is approved, the title under Fig. 76-A, Page 116 of Wheel and Axle Manual should be changed to read: "Gage for Out-of-Round Cast-Iron, One-Wear Wrought- and One-Wear Cast-Steel Wheels."

Rule 82, Broken Rim—It has been recommended that Rule 82 be amplified by the addition of Par. (d) in Rule 82, establishing a remount limit for broken rim.

The report was submitted by Chairman H. W. Coddington, chief chemical and test engineer, Norfolk & Western, Roanoke, Va.; Vice-chairman D. Wood, engineer of tests, Southern Pacific, San Francisco, Cal.; H. H. Haupt, general superintendent motive power, Pennsylvania, Pittsburgh, Pa.; E. E. Chapman, mechanical assistant, Atchison, Topeka & Santa Fe, Chicago; J. Matthes, chief car inspector, Wabash, Decatur, Ill.; A. G. Hoppe, assistant mechanical engineer, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis.; A. M. Johnsen, engineer of tests, Pullman Company, Chicago; E. C. Hardy, assistant engineer, New York Central, New York; W. R. Hedeman, engineer of tests, Baltimore & Ohio, Baltimore, Md.

(*The report was approved and recommendations ordered submitted to letter ballot. The committee was directed to give serious consideration to reducing the limit of wear of wheels used in high-speed service and to work with the manufacturers in developing the most satisfactory wheel for ultra high-speed service.*)

Couplers and Draft Gears

The tight-lock coupler adopted in 1937 as alternate standard to the standard Type E coupler for passenger service, is receiving further attention on the part of the coupler manufacturers in the nature of refinements of finish during manufacture of certain parts of the coupler relating to the contour lines. These refinements are being worked out to improve the fitting and interchangeability of parts as produced by the different coupler manufacturers.

Up to the present time, orders have been placed upon the coupler manufacturers for approximately 1,000 tight-lock couplers. The reports relating to the service obtained from these couplers have been gratifying. The Mechanical Committee of the coupler manufacturers is also working on the development of a standard shank or shanks that may be recommended for use in conjunction with tight-lock couplers in passenger service.

Another item in the process of development for use with tight-lock couplers is that of suitable designs of coupler operating rods.

A change has been made in the buffing shoulders of the knuckle and bar in the tight-lock coupler to prevent a worn Type-E knuckle being applied to a tight-lock bar and interfere with its proper operation. This modification was so made that the new tight-lock knuckle will fit the old and new bars, but the old tight-lock knuckle cannot be used in the new bar.

Bottom-Operated Uncoupling Rods for Type E Couplers.—The bottom-operating mechanism of the Type E coupler has been confined to a one-rod type. It has developed that certain features of this bottom-operating rod mechanism are patented, which restricted the source of supply to one manufacturer. The demand for a type of operating mechanism free from any such restrictions has resulted in the development of a two-piece type bottom-operating rod which is comparable in its functioning with the one-piece operating rod.

High-Tensile Steel Type E and Tight-Lock Couplers.—Your committee is working with the Mechanical Committee of the coupler manufacturers in the preparation of specifications for tight-lock and Type E couplers in high-tensile steel. When these specifications have been approved by the coupler committee, they will be submitted to the specifications committee for its consideration.

Coupler Shank and Attachment Tolerances.—In the 1937 report of your committee, recommendation was made relating to the revision of manufacturing tolerances of coupler and draft gear attachments; this recommendation having been based upon observations made in connection with the derailment of a certain lot of new refrigerator cars in which it appeared that restriction in the horizontal angling of the couplers was occurring due to the influence of draft-gear compression forces against the butt of rigid-shank Type E couplers. The subject was referred back to the committee for further consideration.

In the study of this subject, the committee has reviewed present manufacturing practices for couplers and yokes, especially as regards the involved dimensions and variations and concludes that certain changes in limiting tolerances could be made to good advantage. The normal length of the yoke from the rear draft-gear bearing pad to the front of key slot is 34⅝ in. The range in variation in this dimension for each manufacturer is within reasonable limits, but there exists too great a differential between the products of different manufacturers and varies from —⅛ in. to +¼ in.

In checking the length of coupler shank from the back of the key slot to the end of the shank as furnished by several coupler manufacturers, it is again found that the range in variation for each manufacturer is within reasonable limits, but there exists too great a range in the variation as between manufacturers, varying from —1/16 in. to +3/16 in.

A comparison of the key slot to butt dimension on couplers before the butt surface was ground to suit requirements showed similar wide variations. A review of this condition indicates the importance of improving manufacturing practices so that the limits of variations conform to the standard specified and the committee feels that this should be the first action toward improving present conditions. Dimensions and tolerances in accordance with the committee's proposal will provide a maximum 3/16 in. free slack and a maximum 7/32 in. compression when assemblies are made with combinations of dimensions that will develop the two extremes.

The present A. A. R. standards provide for the coupler shank and width of key, but do not provide tolerances for the length of yoke and the length of gear pockets in the sills. Your committee, therefore, recommends that the following tolerances be submitted to letter ballot for adoption as standard:

(1) No change in present standard tolerance governing the length of the coupler shank from the back of the key slot to the end of the shank.

(2) No change in the present tolerance governing the width of the standard draft key.

(3) That the length of the vertical-plane cast-steel yoke be 34⅝ in. from rear draft-gear pad to the front of the key slot, tolerance —1/16 in. and +⅛ in.

(4) That the length of the standard gear pocket in the car sills be 24⅝ in., tolerance +0 in. and —1/16 in.

(5) That the Mechanical Committee of the coupler manufacturers be requested to develop and submit for approval, a suitable gage for measuring the length of coupler yokes and maintaining the tolerances specified, Item 3, above.

Safe-Lock Couplers.—The committee has had on its docket for some time, a suggestion for a safe-lock coupler that would prevent vertical slip-overs and also serve to support a coupler that was pulled from its attachments in the adjacent car. The design suggested was of such a nature that it would not couple with the standard tight-lock coupler and an effort was made to provide a design of safe-lock coupler that would not change the contour lines sufficiently to prevent its use in conjunction with any recognized standard coupler. This matter is also being given consideration by the coupler manufacturers but to date no satisfactory design has been evolved. While this subject is still being studied it is believed that the situation relating to pulled-out couplers and vertical slip-overs is being materially and effectively remedied by the improvements that are being made in draft gears and draft-gear attachments and the more extended use of 11-in. face knuckles.

Type E Knuckles Breaking Due to Defective Material.—A few failures have been reported with Type E knuckles breaking in service as a result of defects in manufacture. This matter has been brought to the attention of the coupler manufacturers and an intensive study has been made with the result that considerable constructive information was developed and foundry practices corrected insuring the quality of knuckle castings being maintained to the end that they meet the established strength tests.

Means for Raising Low Couplers.—Your committee has given consideration to recommending some convenient means for maintaining coupler heights in alignment with the draft gears where there is sufficient space between the coupler shank and the striking casting to accommodate the application of a plate between the coupler carrier and bottom of the coupler shank.

Adjustment of coupler height through this means not only brings the coupler in better alignment with the draft gear and attachments, but is an effective means of increasing coupler height, since usually the increase in coupler height is three times the thickness of the shim applied. Recommendation in regard to this subject has been made to the Arbitration Committee together with suggested designs of plates that can be conveniently applied in conforming with this recommendation.

Type D Couplers Opening in Service.—The committee has investigated reports from various railroads that passenger trains were parting where bottom-operated Type D couplers were in use. The investigation disclosed that these partings were principally occasioned by the couplers being equipped with an obsolete design of bottom lock-lift toggle instead of the No. 2 or No. 3 type toggle with the improved anti-creep feature.

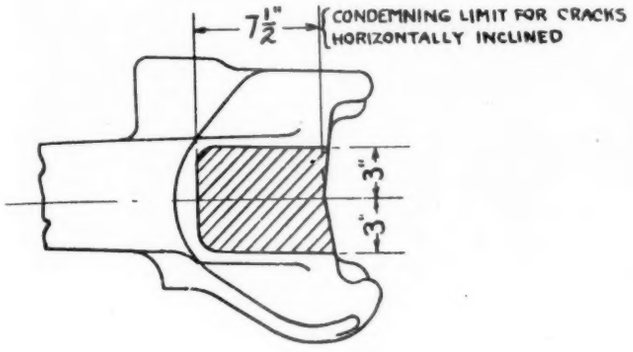
On account of the importance of this subject, a circular covering this condition was prepared and sent out by the secretary as Circular DV-928 dated December 7, 1937. If the suggestions covered in this circular are followed, trouble on account of Type-D bottom operated couplers opening in service due to ineffective anti-creep should be eliminated.

Reclamation of Couplers, Knuckles and Locks.—Present A. A. R. Rule 18, Sec. (a) provides certain limits beyond which a coupler body may be condemned for cracks in the knuckle-tail side wall, yet still be within limits for reclamation. When such couplers are condemned, the owner is allowed a scrap credit of $1.43 for 6-in. by 8-in. shank Type D coupler body; the coupler body can be reclaimed at a nominal cost in the neighborhood of $2.50 and placed on another foreign car at a second-hand value of $11.76. Questions have also been raised relative to the interpretation of this rule and the limits prescribed in Fig. C. The rule and the limits have received careful consideration by your committee as a result of which the following recommendations are made:

Proposed.—Such crack extends beyond the shaded area, Fig. C, shown on page 56. When crack extends beyond the shaded area, the coupler body is condemned and must not be reclaimed by welding. [Note: Revised Fig. C is illustrated.]

Coupler bodies cracked within the shaded area must have the cracks welded when applied to foreign cars.

If the revision of Rule 18 (a) is approved by the association, Rule 23, Sec. 4, Couplers; Passenger Car Rule 7; and Fig. 5 in



Revised Fig. C

the second-hand coupler specifications should be revised to conform thereto.

Cast-Steel Coupler Yokes (Std. Repair Type).—Your committee, in conjunction with the Mechanical Committee of the coupler manufacturers, has made several attempts to design a cast-steel yoke that could be adapted to various draft-gear installations and reduce the number of individual designs the manufacturers are being called upon to supply. Efforts along this line have not been sufficiently satisfying to justify a recommendation. The committee also has under consideration the possibility of using a combination cast-steel head and wrought strap yoke, the head being designed for application with horizontal cross key, and also designed so that the yoke will be secured with short rivets acting in double shear, whereas the same yoke secured to a coupler shank with long rivets would be subjected to single shear.

The study the committee has made of this proposition is not sufficiently advanced to warrant a recommendation at this time.

In conclusion, your committee recognizes the splendid cooperation received throughout the year from the Mechanical Committee of the coupler manufacturers in the advancement of the problems handled by this committee.

The report was presented by Chairman R. L. Kleine, assistant chief motive power, Pennsylvania, Philadelphia, Pa.; Vice-chairman H. W. Coddington, chief chemical and test engineer, Norfolk & Western, Roanoke, Va.; C. J. Scudder, chief motive power, Delaware, Lackawanna & Western, Scranton, Pa.; L. P. Michael, chief mechanical engineer, Chicago & North Western, Chicago; J. P. Morris, mechanical superintendent, Atchison, Topeka & Santa Fe, Ft. Madison, Iowa; H. W. Faus, engineer motive power, New York Central, New York.

Report of Subcommittee on Draft Gears

Two new applications for certificates of approval have been received within the past year. Tests of one of these types are now in progress and the other type will be tested as soon as representative test specimens can be obtained.

During the year, several applications for approval of minor changes in certified gears have been acted upon by the committee. Also, as a result of information uncovered by the annual canvass of the draft-gear manufacturers, several corrections have been made in the records which are on file showing the construction of approved gears.

Steps have been taken to make check tests of the approved draft gears, as provided for in A. A. R. Specifications for Approved Draft Gears, M-901-36, Appendix A, Par. 15. This work is now in progress.

In addition to the work covered by the above projects, the draft-gear testing laboratory has done considerable development work for manufacturers of draft gears and truck springs and has also given some time to perfection of instruments for making draft-gear and truck-spring tests.

At the request of this committee, the Car Construction Committee has made a slight modification in the drawing showing draft-gear carrier used with horizontal yoke, in order to prevent binding of the draft gear under certain conditions in the new Z-section center sill. In this connection closer limits have been set for the external dimensions of approved gears. All draft-gear manufacturers have agreed to be governed by these new limits pending revision of existing specifications which will be deferred for the present in order to save printing expense.

No additional action has been taken on the subject of road tests during the year. It has been continued on the docket because it is felt advisable to make such tests as soon as circumstances warrant.

The subcommittee report was presented by Chairman H. W. Faus, engineer motive power, New York Central, New York; H. W. Coddington, chief chemical and test engineer, Norfolk & Western, Roanoke, Va.; L. H. Schlatter, foreman, Pennsylvania test department, Altoona, Pa., and W. Bohnstengel, assistant engineer of tests, Atchison, Topeka & Santa Fe.

(*The report was approved and recommendations ordered submitted to letter ballot.*)

Brakes and Brake Equipment

In view of the fact that the size of letters or figures for air-brake markings has been increased from 1 in. to 1½ in., the 3/32-in. bridges now used are too narrow to prevent excessive breakage of stencils. In order to strengthen these stencils and reduce the tendency for breakage, we recommend the adoption of increased width of bridges in stencils to 3/16 in., and that necessary revision be made to figures on pages 118 and 119 of the Interchange Rules and pages E-43 and E-45 of the Manual of Standard and Recommended Practice.

Foreign Substance in Emergency Portion of Type-X AB Brakes

Complaint has been received with reference to various types of plugs used to protect the emergency vent port of the Type AB brake emergency portion when being shipped from shops to various repair points. In some cases common corks have been used and in others metal or wooden plugs covered with rags of various kinds. In applying or removing such plugs, breakage occurs which permits a part of the plug being left in the emergency port and which finds its way under the vent valve, holding this valve off its seat and rendering the valve inoperative.

The air-brake manufacturers, when shipping these parts, close the atmospheric openings with flanged metal thread protectors which are readily removed without possibility of parts being left in the valve structure. This type of plug should be used, or a threaded plug which will screw into the emergency vent port similar to a common pipe plug where the atmospheric opening is threaded, such as applies to all but the earlier types of AB brakes.

We would suggest advising the railroads with reference to this feature, in order that it will not become common practice to resort to plugs of such character that they might inadvertently enter the operating parts either when being applied or removed from the valve openings.

Wasp Excluder for Retaining Valve

The committee has for the past several years endeavored to provide a simple and inexpensive means of protecting the freight retaining valve against stoppage of the exhaust port by mud-bees and wasps. The member roads have tried out two different types of brass plugs having slotted openings. The first type proved unsatisfactory because of being affected by sleet and ice in winter weather. The second type overcame this difficulty but does not provide a large enough dirt compartment so that it will run throughout the ordinary cleaning period for brake equipment without the openings being restricted or closed.

This question has been gone over with the air brake company with a view of re-designing the retaining-valve body so that a larger exhaust opening may be provided which will overcome the inherent faults of the above plug type protectors. This

feature is now being developed and if it proves satisfactory, a practical device can be introduced into service through the ordinary renewals of retaining valves.

Brake-Beam Tension-Rod Nuts

The Chicago Railway Equipment Company has developed a sleeve nut which has the seat of the nut chamfered off to provide a seat somewhat in the nature of a ball joint. The sleeve surrounding the rod and being a part of the nut is about 2¾ in. long, and being a close fit on the rod, keeps the nut in alignment with the rod and causes it to revolve and follow the direction taken by the rod when weaving of the beam occurs for any reason, thus eliminating strain on the rod in the threaded portion. The use of this device does not affect interchangeability of parts and there is no penalty involved for non-use in repairs.

The committee has no objection to the interchange of cars equipped with this new design of tension-rod nut.

Arrangements have been completed for inspecting and testing 100 Pennsylvania and 100 A. T. & S. F. cars equipped with Type AB brakes having new type Westinghouse and New York brake-pipe strainers, which were developed as a result of conditions found upon our last inspection which affected the charging chokes and passages because of rust and foreign matter which was not excluded sufficiently to prevent restricting the rate of normal charging of the brake system.

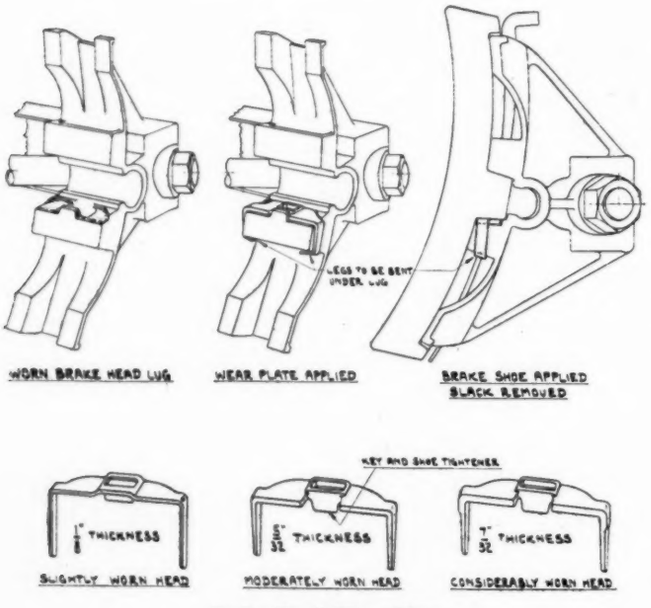
This inspection has not progressed to a conclusion, and report covering our findings will be submitted as soon as all cars are available for this investigation.

Gages for U. C. Protection Valve

In order to prolong the service life of the protection valve in the universal control valve, we recommend changing the dimension of gage No. 37016 from 1.241 in., as shown on page B-80-1935, Manual of Standard and Recommended Practice, to 1.239 in.

Temporary Repairs for Brake-Beam Heads

For the past seven or eight years, various member railroads have used a wear plate of the type shown in the accompanying drawing when the distance between the upper and lower brake-shoe lugs of the brake-beam head measure 2¼ in. or more at the face of the head and the head otherwise meets the A. A. R. requirements at the time periodical repairs to air brakes are made, or when cars are found in train yards with brake-head wear as described.



Brake Head Wear Plate

Many thousands of these plates have been applied to restore the lug openings to their original measurements and to provide for tightly securing the brake shoe in the brake head. These plates have rendered satisfactory service, and the approval of their general use would avoid the expense involved in removing brake beams from cars and sending them to repair shops or reclamation points for reconditioning.

We would recommend that cars carrying brake beams equipped with a device as shown in the accompanying drawing and titled "Brake-Head Wear Plate" be accepted in interchange so long as the application of such wear plate provides for reducing the opening between the brake-shoe lugs to less than 2¼ in.

Other Subjects Under Consideration

The following subjects are also being actively considered by the committee: Gages for remounted couplings, test codes for single-car test devices, standardization of No. 3 brake beam, brake-beam gages, power brakes for ultra-high-speed trains, lightweight brake beams for lightweight cars, braking ratio for passenger cars and locomotives, maintenance and inspection of brake beams and attachments, copper tubing and brass fittings for air-brake lines, and procedure for cleaning and testing Type AB brakes on repair tracks.

The report was signed by Chairman G. H. Wood, supervisor air brakes, Atchison, Topeka & Santa Fe, Topeka, Kan.; Vice-chairman W. H. Clegg, chief inspector air brake and car heating equipment, Canadian National, Montreal, Que.; T. L. Burton, air-brake engineer, New York Central, New York; R. J. Watters, general air-brake inspector, Northern Pacific, St. Paul, Minn.; C. H. Rawlings, general air-brake instructor, Denver & Rio Grande Western, Denver, Colo.; M. A. Kinney, general master mechanic, Chesapeake & Ohio, Columbus, Ohio; R. C. Burns, general foreman, Pennsylvania, Philadelphia, Pa.; L. S. Ayer, general air-brake inspector, Southern Pacific, San Francisco, Cal.; J. P. Stewart, general supervisor air brakes, Missouri Pacific, St. Louis, Mo.; R. E. Baker, general air-brake inspector, Boston & Maine, Boston, Mass.

(*The report was approved and recommendations ordered submitted to letter ballot.*)

Prices for Labor and Materials

In order that the rules may currently provide an equitable basis for inter-road billing, the committee has continued the work of analyzing material, labor and new equipment costs in A. A. R. Interchange Rules 101, 107, 111 and 112 of the Freight Car Code, and Rules 21 and 22 of the Passenger Car Code, with a view of determining and recommending necessary changes to be made in the next supplement to the current Code.

Rule 101

All miscellaneous material prices in Rule 101 were rechecked as of March 1, 1938, quotations from purchasing agents of the 10 selected railroads, representing 39 per cent of total freight-car ownership in the United States and Canada, indicating no changes were necessary in new or scrap prices except in the case of pipe fittings.

Due to changes in combination labor and material items in Rule 111 effective January 1, 1938, Items 38, 40, 42, 45, 46, 47, 48 and 49 of Rule 101 covering retaining valves and release valves, are modified to harmonize.

Item 49-A is relocated as new Item 82-A under list of AB type brake material and modified to cover material only, the labor charge being provided for in Item 27 of Rule 111. Former Items 58 to 76, inclusive, have been relocated as new Items 98 to 99-G, inclusive. Note following Item 57-U is relocated to follow new Item 85.

New Items 58 to 85, inclusive, have been added, covering AB type brake material.

Allowances opposite Items 116, 118 and 120 have been reduced to basis of 60 per cent instead of 75 per cent of value new for type-D coupler bodies, and those opposite Items 124 and 125 to basis of 30 per cent instead of 50 per cent of value new for former and temporary standard couplers, to agree with adjusted allowances for older types of couplers in Rule 104, as suggested

by the Committee on Couplers and Draft Gears and recommended in the 1938 report of the Arbitration Committee.

The table of weights of truck spring coils is modified to include weight of the 5½-in. by 8¼-in. spring. Reference to truck-spring capacity is eliminated from this table since it is unnecessary for billing purposes.

Rule 107

Notes are added to Items 128 and 158, and the last note under Item 270 is modified, to clarify the intent.

Allowances opposite Items 260 and 261 are modified in accordance with detail time studies of these operations.

Former Items 301 to 316, inclusive, covering specified allowances for dismantling various types of cars, are eliminated; and a new Item 301, with notes, added, to establish price for dismantling all types and classes of cars on authority of owners, on a per pound price for metal contained in car. It is felt this method of charging will simplify the rule. The allowance is equitable, being based on actual time studies of the operation made by a special subcommittee on five railroads and including 29 cars of various classes and types.

Rule 111

Revision of Item 15, to provide an average charge (including both labor and material) for C. O. T. & S. of AB freight brake equipment, based on time studies conducted on six railroads in various sections of the country, is recommended. This is similar to the allowance now in the rule for C. O. T. & S. of K. type brakes; it greatly simplifies the billing and eliminates the necessity for following individual valves through the air-brake room or manufacturer's plant and holding billing until a list of the material renewed in each case is available. It will also eliminate numerous controversies arising in connection with such charges.

New Items 16 to 27, inclusive, are added to this rule, to establish definite allowances for a number of operations in connection with AB brake equipment parts, now charged on the basis of actual time. These allowances are also based on time studies of the various operations.

Interpretation No. 1 is modified to harmonize with the change in allowance in Item 3 of this rule.

Rule 112

Recommendations are made in this rule respecting reproduction pound prices of new freight-train cars of all classes, in order that Supplement of August 1, 1938, may reflect 1937 costs in lieu of figures shown in the present Code. New prices recommended are based on costs of 47,270 freight cars constructed during the year 1937.

As Class F cars (all-wood) were prohibited in interchange effective April 1, 1937, and the Arbitration Committee eliminated this class of car from the depreciation rate and depreciation limit tables in Rule 112 effective January 1, 1938, it is recommended that the Class F car also be eliminated from the per-pound reproduction-cost table.

Passenger Car Rules 21 and 22

Item 25-B of passenger-car Rule 21 is modified to clarify the intent with respect to prices for two-wear wrought-steel wheels. No modifications are recommended in passenger-car rule 22.

It is the intent of the Committee to investigate labor and material costs again in October and if sufficient change develops, necessary revision will be made and inserted in the Rules effective January 1, 1939.

[The changes recommended in the existing rules are shown in detail in the report.—Editor.]

The report was signed by A. E. Calkins (chairman), superintendent equipment, New York Central; H. H. Harvey (vice-chairman), general car foreman, Chicago, Burlington & Quincy; T. J. Boring, general foreman, M. C. B. Clearing House, Pennsylvania; H. H. Boyd, assistant chief motive power and rolling stock, Canadian Pacific; A. E. Smith, vice-president, Union Tank Car Company; A. H. Gaebler, superintendent car department, General American Transportation System, Inc.; P. Kass, superintendent car department, Chicago, Rock Island & Pacific; F. J. Dodds, general car inspector, Atchison, Topeka & Santa Fe; O. A. Wallace, supervisor car repairs, Atlantic Coast Line; and D. F. Nourse, A. A. R. inspector, New York, New Haven & Hartford.

The report was accepted.

Report on Tank Cars

During the year the committee considered a total of 346 dockets and applications for approval of designs of which 221 covered shipping containers of twenty classes, for application to new cars or for replacement on existing cars. Four applications covered 27 multi-unit cars to be used for the transportation of 15 Class ICC-106-A-500 one-ton containers each. Sixteen applications covered 187 new underframes and trucks for use in mounting existing tank-car tanks.

Eighty-three applications covered alterations in existing equipment consisting of application of exterior heater pipes, interior heater pipes, insulation, lining, reinforcing bands, tank stabilizers, tank shell reinforcement at dome flange and reinforcement at center sills of multi-unit tank cars, also conversion from single to two compartments, from single to three compartments, from ARA-III to ARA-III insulated, from ARA-IV to ARA-III insulated, from A.R.A.-IV to A.R.A.-III, from ICC-103 to ICC-103 insulated, from ICC-103 to ICC-103-A, from ICC-103 to ICC-103-B, from ICC-103 to ARA-203, from ICC-104 to ICC-103 insulated, and conversions for Fullers Earth service and for phosphorus service.

Eighteen applications requested approval of tank-car appurtenances as follows: One anchorage for Class ICC-105-A series tank cars in chlorine service; one angle valve for propane and anhydrous ammonia service; two bottom-outlet nozzle, steam-jacketed; one bottom-outlet valve for tanks in asphalt service; one dome cover, bolted type, modified design; two dome safety platform; one dome-cover safety device; one dome cover, quick opening; one insulation; one protective housing for top unloading connections; one removable eduction tubes for Class ICC-106-A-500 containers; one sampling device; one safety valve, tanks in chlorine service; one safety valve, tanks in propane and anhydrous ammonia service; one safety vents, Class ICC-103-B tank-car tanks; one valve for Class ICC-106-A-500 containers, design modified.

Tank Cars for Dual Lading Service

The Interstate Commerce Commission, by modification, effective April 15, 1938, of second subparagraph, Par. 431(a) of their regulations for the transportation by rail of explosives and other dangerous articles in freight service permitted the use of tank cars "equipped and authorized as indicated by the name of the commodity stenciled on the tank" for additional use in transporting other commodities under requirements prescribed therein.

A total of four applications has been considered by your committee under this requirement, one covering cars for transporting propane or anhydrous ammonia and three for cars to transport anhydrous ammonia or nitrogen fertilizer solution.

Fusion-Welded Tank-Car Tanks

Since the public hearings before the Interstate Commerce Commission, at Washington, D. C., on September 5, 6 and 7, 1934, on the matter of fusion-welded tank-car tanks for the transportation of dangerous commodities the commission have authorized, by order, a total of 523 fusion-welded tanks for experimental service trials.

No general revision of the Interstate Commerce Commission specifications for tanks to be mounted on or to form part of a car has been made since 1930. Your committee is now actively engaged in revising the specifications, effective in 1931, bringing them into conformity with current demands of owners, shippers and other interested parties.

Aluminum Tanks for Transporting Dangerous Commodities

By order, the Interstate Commerce Commission has authorized the construction of 30 tank cars equipped with riveted aluminum

tanks (Class ICC-103-AL) and their use in experimental trials in transporting commodities classed as dangerous by the commission's regulations.

The report was presented by Chairman G. S. Goodwin, assistant to general superintendent motive power, Chicago, Rock Island & Pacific, Chicago; Vice-chairman F. A. Isaacson, engineer car construction, Atchison, Topeka & Santa Fe, Topeka, Kan.; A. G. Trumbull, chief mechanical engineer, Chesapeake & Ohio, Cleveland, Ohio; G. McCormick, general superintendent motive power, Southern Pacific, San Francisco, Cal.; W. C. Lindner, chief car inspector, Pennsylvania, Philadelphia, Pa.; A. E. Smith, vice-president, Union Tank Car Company, Chicago; G. A. Young, head, school of mechanical engineering, Purdue University, La-Fayette, Ind.; F. Zeleny, engineer of tests, Chicago, Burlington & Quincy, Aurora, Ill.; W. C. Steffa, transportation manager, Sinclair Refining Company, New York; R. T. Baldwin, secretary, Chlorine Institute, Inc., New York; H. J. Gronemeyer, supervisor car equipment, E. I. duPont de Nemours & Company, Inc., Wilmington, Del.; R. W. Thomas, manager Philgas department, Phillips Petroleum Company, Detroit, Mich.

(*The report was approved.*)

Report of the Committee on Loading Rules

General Rules

Rule 4

Change wording of Section (c) to read:

To obtain full capacity or load weight the load should be placed in two piles over bolsters or uniformly distributed over car floor. Short material loaded between body bolster and end of car must not exceed twenty per cent of stenciled load limit. Concentrated loads 18 ft. long or less must not exceed seventy-five per cent of stenciled load limit.

Eliminate the note following Section C.

Reason—Reference to wooden cars now unnecessary.

Rule 8

Eliminate and substitute the word "Vacant" in Section (c).

Reason—Not required because wooden underframe cars are not interchangeable.

Rule 16

Add to first sentence of Section (a) "except as provided for in paragraph (f)".

Change Section G to read:

When material is of unequal lengths and overhanging one or both ends, the weight of load shall be based on the average lengths of pieces in the overhang, measured from center of truck to ends of load. When the material in the overhang is of various lengths, the allowable width shall be based on the total width of the overhang at the extreme ends. Table I is based on the end of load opposite the overhanging and being located 18 in. from the face of end sill of car. In cases where the type of brake and load permits utilizing part or all of this space, thereby, making the overhang less than specified in the tables, the width of load and the percentage of load weight may be increased in accordance with the shorter overhang.

Reason—To clarify the intent of the rule.

New Figures Proposed

New figures have been proposed, for addition to the rules, as follows:

Fig. 5—To show the length of slotted hole for center pin in center-plate backing.

Fig. 46-A—Revised method for loading light roof trusses.

Fig. 56-A—Alternate method for securing structural steel, shapes and rods with high-tension bands.

Fig. 75-A—Method of loading wire coils.

Fig. 83-A—Alternate method of using 1¼-in. instead of 2-in. high-tension bands for securing wrought-iron pipe.

Fig. 146-A—Alternate method for securing locomotive type boilers with high-tension bands.

Fig. 146-B—Alternate for securing small boilers with high-tension bands.

Revisions to Existing Figures

Fig. 6

Add note following item F to read: *For loads per sketch 2, use not less than 8 pr. of stakes, items B, and eliminate items D and F.*

Reason—By request of shippers.

Fig. 27

Sketch and specifications revised to include binder added at center to provide greater safety.

Fig. 28

Change heading to read:

Minimum requirements for securing entirely creosoted and other poles, etc.—*gondola cars.*

Change item C to read:

Number of Pieces	Description
For loads 3 ft. or less above top of car sides, 1 ea. pr. stakes.	4 strands, 2 wrappings, ⅛ in. dia. wire across top of load, twisted taut.
For loads over 3 ft. above top of car sides, 2 ea. pr. stakes.	6 strands, 3 wrappings, ⅛ in. dia. wire, halfway between top of car sides and top of load and over top load. For entirely creosoted poles use 3 items C, equally spaced. Twist taut.

Change last paragraph to read:

When ends of 2 piles are interlaced, use 6 pair of stakes for total length of load, unless interlace exceeds 36 in., when 5 pair of stakes for total length of load may be used with 1 pair at center of interlaced ends.

Reason—To provide greater safety.

Fig. 29

Sketch and specifications revised to include binder, added to provide greater safety.

Fig. 30

Sketch and specifications revised to provide greater safety.

Fig. 31

Change heading to read:

Minimum requirements for securing long poles, piling, telegraph poles, etc., excluding entirely creosoted poles, loaded on top of single loads—*flat or gondola cars.*

Reason—To indicate that this figure does not cover entirely creosoted poles.

Fig. 32

Sketch and specifications revised to cover loads overhanging at one or both ends of car, or loads on two or three cars.

Fig. 35

Change item E to read:

Number of Pieces	Description
3 per pile.	6 in. by 8 in., hardwood, length to suit. For piles 20 ft. to 30 ft. long, inclusive, the center clamps may be substituted with 2 pr. items B.

Change item G to read:

2 ea. item E. 1 in. dia. *with washers.*

Change second paragraph to read:

Items E, F, G and H are not required when *more than 3 pr. items B, C and D* are used or vice versa.

Reason—To strengthen load as per request of shippers.

Fig. 37

Sketch and specifications revised.

Reason—Item E, eliminated—not required.

Fig. 38

Sketch and specifications revised.
Reason—Item F, eliminated—not required.

Fig. 41

Change heading to read:
Minimum requirements for securing flat plates, on top of car with sides not over *48* in. high.
Reason—To make applicable to modern equipment with car sides 48 in. high.

Fig. 42

Change heading to read:
Minimum requirements for securing flat plates, on top of car with sides not over *48 in.* high.
Reason—To make applicable to modern equipment with car sides 48 in. high.

Fig. 43

Change the second note following item E to read:
Plates 24 in. wide or less, and not more than 18 in. less than inside width of car, loaded crosswise as per sketch 3, do not require bracing to prevent side shifting when the ends of alternate piles are placed against car sides.
Reason—To indicate when bracing is required to prevent side shifting.

Fig. 46

Eliminated.
Reason—Being consolidated with Fig. 47.

Fig. 47

Sketch and specifications revised.
Reason—Diameter of rods for loads weighing 30,000 lb. or less increased from ¾ in. to ⅞ in., and from ⅞ in. to 1 in. for loads weighing over 300,000 lb., and rods of 1¼ in. dia. eliminated, by request of shippers.

Fig. 48

Change item C to read:
6-in. by 8-in., hardwood. Place one bolt, ½ in. dia., crosswise, with washers, at each end to prevent splitting.
Reason—By request of shippers.
Change second sentence of item G to read:
When sliding-piece is located between end of car and body bolster, the weight on same must not exceed 20 per cent.
Reason—To eliminate reference to wooden and steel underframe cars.
Add new paragraph to read:
For flat cars add one binder to overhang, above couplers, in which case dimensions of binders may be 4 in. by 6 in., with split bolts.
Reason—To strengthen load on flat cars.

Fig. 49

Change item C to read:
6 in. by 8 in., hardwood. ½ in. dia. bolt with washers at each end to prevent splitting.
Reason—By request of shippers.
Eliminate second sentence in last paragraph reading: Load carried between bolster and end of adjacent car must not exceed 15 per cent of load weight limit, wooden underframe cars, and 20 per cent of load weight limit, steel underframe cars.
Reason—Covered in General Rule 4.

Fig. 50

Change item C to read:
6-in. by 8-in., hardwood. ½ in. dia. bolt with washers at each end to prevent splitting.
Reason—By request of shippers.
Eliminate second sentence in last paragraph reading: Load carried between bolster and end of adjacent car must not exceed 15 per cent of load weight limit, wooden underframe cars, and 20 per cent of load weight limit, steel underframe cars.
Reason—Covered in General Rule 4.

Figs. 51 and 51-A

Eliminate the words "and 17", from next to last paragraph.
Reason—Rule 17 has been eliminated.

Fig. 52

Change item C to read:
6-in. by 8-in., hardwood. ½ in. dia. bolt with washers at each end to prevent splitting.
Reason—By request of shippers.
Eliminate the words "and 17" from last paragraph.
Reason—Rule 17 has been eliminated.

Fig. 53

Sketch and specifications revised.
Reason—Reference to girder loading eliminated.

Fig. 54

Sketch and specifications revised.
Reason—Reference to girder loading eliminated.

Fig. 55

Eliminated.
Reason—Consolidated with Figs. 53 and 54.

Fig. 57

Sketch and specifications revised.
Reason—Reference to girder loading eliminated.

Fig. 62, 63, 63-A, 64, 66 and 135

Reference to New Fig. 5 included for length of slotted center pin hole.
Reason—Fig. 5 has been provided to show length of slot in center-plate backing, as it has been found that present length of slot is not adequate for safe transportation of long girders, etc.

Fig. 77

Change heading to read:
Minimum requirements for securing sheet steel one-eighth inch thick or less in single-tiered piles, 20 in. high or less above car floor, with No. 8 gage high-tension wire, strength 2,000 lb. per strand, and with ends of load not less than 6 ft. from ends of car—flat cars.
Reason—To indicate the maximum thickness of sheets covered by this method of loading.

Fig. 78

Change heading to read:
Minimum requirements for securing sheet steel one-eighth inch thick or less, in single-tiered piles, 20 in. high or less, above car floor, with high-tension bands, and with ends of load not less than 6 ft. from ends of car—flat cars.
Reason—To indicate the maximum thickness of sheets covered by this method of loading.

New Fig. 83-A

Sketch and specifications revised.
Reason—Shippers requested alternate method of using 1¼-in. instead of 2-in. high tension bands.

Fig. 115

Change note to read:
Note: Items B to G, inclusive, may be substituted with two strands, one wrapping, ⅛ in. dia. wire in cases where load extends six inches or less above top of car sides, or ends, or when pyramided from top of car sides to not more than 18 in. at center of car and wired down so as to prevent scrap from projecting beyond car sides or ends. Wire must be spaced not more than 3 ft. apart and secured to stake pockets or car sides.
Reason—To improve the method of loading.

Alternate to Present Fig. 127

The committee has been working on a method for securing transformers on flat cars, alternate to present Fig. 127, but was unable to complete it in time for this report. Efforts, however, are being made to have it completed in time for letter ballot, a

large shipper having requested that it be included in the next issue of the loading rules.

FIG. 153

Change first paragraph to read:

Anchoring the rotating portion to crawler structure with items Q, 2 at rear and 2 at front, is permissible, provided the machine is tied to car, at front and rear, with suitable rods or cables to prevent teetering. When boom is detached, items Q must be applied at rear to car body and at front to the crawler structure.

Reason—To clarify the intent of the rule.

FIG. 168-B-

Eliminated.

Reason—Shippers decline to use it because it is too expensive.

FIG. 176

Change item G under "No. of Pcs." to read:

4 ea. axle.

Reason—To clarify the intent.

The report was signed by W. B. Moir (chairman), chief car inspector, Pennsylvania; E. J. Robertson (vice-chairman), superintendent car department, Minneapolis, St. Paul & Sault Ste. Marie; R. H. Dyer, general car inspector, Norfolk & Western; G. R. Lovejoy, master mechanic, Detroit Terminal; T. O. Sechrist, assistant superintendent machinery, Louisville & Nashville; C. J. Nelson, superintendent of interchange, Chicago Car Interchange Bureau; H. S. Keppelman, superintendent car department, Reading; T. W. Carr, superintendent rolling stock, Pittsburgh & Lake Erie, and A. H. Keys, district master car builder, Baltimore & Ohio.

The report was approved and recommendations ordered submitted to letter ballot.

Rules for Using Liquid Petroleum Gases

The attention of your Subcommittee on Underwriters' Laboratories Tentative Outline for Inspection and Labeling of Self-Propelled Railroad Equipment Utilizing Internal Combustion Engines was brought by the Railroad Insurance Association to the necessity for specifications for the installation of containers for liquefied-petroleum-gas systems and piping or other facilities to the gas-consuming unit, including internal-combustion engines for self-propelled cars or auxiliary units, and heating for various purposes, as well as lighting.

In view of the varied interests involved a conference was held by your committee on October 26, 1937, with representatives of the following associations and companies: Underwriters' Laboratories, Inc., Railroad Insurance Association, Compressed Gas Manufacturers Association, National Bottled Gas Association, Shell Petroleum Corporation, Phillips Petroleum Company.

During the years 1935, 1936 and 1937, the use of liquefied petroleum gases by the railroads has increased materially. Some of the typical uses of these gases on equipment are: (1) Internal-combustion-engine operation of air-conditioning equipment and electric generators; (2) switching locomotives with electric or geared drive powered by internal-combustion engines; (3) cooking in diners, cafe cars, business cars and freight cabooses; (4) gas lighting of coaches; (5) switch heating to prevent accumulation of snow and ice; (6) metal cutting and miscellaneous shop use, and (7) heating of refrigerator cars in cold weather.

Because of this widespread development it has been necessary to prepare regulations for the guidance of the railroads. These regulations are intended to govern the location, design and construction of fuel containers and other equipment necessary for the safe and efficient use of liquefied petroleum gases on railway coaches, motor cars, locomotives and other mobile equipment, and the storage and handling of these gases in cylinder quantities in railroad yards and terminals.

In the further interests of safety it is equally important that employees understand the inherent hazard of these gases, that they may be thoroughly trained in safe practice for the storage, handling and distribution of fuel containers and in the operation of liquefied petroleum gas utilization equipment.

The Interstate Commerce Commission defines a compressed gas as any material with a gage pressure exceeding 25 lb. per sq. in. at 70 deg. F., or any liquid flammable material having a vapor pressure (determined by the Reid Method) exceeding 40 lb. per sq. in., absolute, at 100 deg. F., March to October, inclusive, or exceeding 45 lb. per sq. in., absolute, at 100 deg. F., November to February, inclusive.

The composition of liquefied petroleum gases varies, but in all of the established grades the predominant compounds are propane and butane (isobutane and normal butane). Under moderate pressure these gases liquefy, but upon release of the pressure are readily converted into the gaseous phase. Advantage of this characteristic is taken by the industry, and for convenience and economy the gases are shipped and stored under pressure as liquids. When in the gaseous state these gases present a hazard comparable to any flammable natural or manufactured gas, except that being heavier than air, ventilation requires added attention.

In the customary method of utilization of liquefied petroleum gases as motor fuel, the liquid is forced by its own vapor pressure out of the fuel tank, through a liquid pressure-reducing regulator to a vaporizer or heat exchanger where it is completely vaporized. The gas then passes through either one or two stages of pressure reduction in approved regulators to reduce it to substantially atmospheric pressure, thence to the gas-air mixer or carburetor where it is mixed with the required volume of air and delivered to the intake system of the engine. Propane can be vaporized directly from the fuel tank without the use of a vaporizer except when the volume used is so great that the refrigeration caused by vaporization reduces the vapor pressure in the tank too greatly. In the latter case and with other liquefied petroleum gas products vaporization is accomplished in a vaporizer or heat exchanger usually heated by water from the engine cooling system or by hot gases from the engine exhaust. When a water-heated exchanger is used in connection with propane it is necessary to provide sufficient exchange surface to prevent freezing of water when self-vaporization of fuel occurs before circulation of water begins.

Generally no vaporizer is needed when propane in cylinders is used for small internal-combustion engines operating car air-conditioning or car electric-generating equipment nor are they needed for gas-cooking or gas-lighting installations, provided a sufficient number of containers are installed to meet the demand of the connected load.

[At this point in the report the committee submitted in detail tentative regulations for the design, construction, installation and operation of liquefied petroleum gas installations on mobile railway equipment.—Editor.]

The report was signed by Chairman W. E. Dunham, superintendent car department, Chicago & North Western; E. Wanamaker, electrical engineer, Chicago, Rock Island & Pacific, and W. J. Madden, assistant foreman, Pennsylvania.

(*The report was approved and ordered submitted to letter ballot for adoption as recommended practice.*)

Report on Specifications for Materials

The committee, during the past year, reviewed all of the specifications and submitted the following revisions for consideration.

SPECIFICATIONS M-115-37, BOILER AND FIREBOX STEEL FOR LOCOMOTIVES

Under Subdivision I, Manufacture, Section 2, add paragraph identified as (c), to read as follows:

(*c*) *All plates shall be cut so that length shall extend in direction of rolling, unless otherwise agreed upon.*

SPECIFICATIONS M-202-37, DESIGN TEST REQUIREMENTS FOR TRUCK BOLSTERS

Revision consisting of adding specification numeral identification in Section 2. Paragraph to read:

2. *Material.—Shall be one of the following, as designated, and*

shall conform to the latest revision of the appropriate specifications:

Cast steel ..... *(Spec. M-201)*
Structural steel ..... *(Spec. M-116)*
Forged iron ..... *(Spec. M-307) or*
Forged steel ..... *(Spec. M-102 and M-104)*

Specifications M-203-37, Design Test Requirements for Truck Side Frames, Cast Steel

Revision consists of adding specification numeral identification in Section 2, the section to read:

2. Material.—Shall be of cast steel in accordance with latest revision of A. A. R. Specifications M-201, Grade B.

Specifications M-205-32, Design Test Requirements for Coupler Yokes

Revision consists of adding specification numeral identification in Section 2, the section to read:

2. Material.—Shall be one of the following, as designated, and shall conform to the latest revision of the appropriate specifications:

Cast steel ..... *(Spec. M-201)*
Structural steel ..... *(Spec. M-116)*
Forged iron ..... *(Spec. M-307) or*
Forged steel ..... *(Spec. M-102 and M-104)*

Specifications M-306-37, Welded Wrought Iron Pipe

Corrections and additions have been made in Sections 1, 2, 3, 5, 6, 12 and 17, and in Table I.

Specifications M-501-34, Lined Journal Bearings

Section 8. Gaging, to be changed to read as follows:

8. Gaging.—All bearings shall conform to the latest standards of the Mechanical Division of the Association of American Railroads, with respect to form, dimensions and variations therefrom, *as shown on sheets B-21 and D-23 of the Manual of Standards and Recommended Practice.*

Changes in Specifications for Rubber Products

Each of the specifications pertaining to rubber has been revised extensively as to form and substance, and recommended specifications were included as part of the report. Those specifications are:

Specification No.	Title
M-601-38	Hose, air brake and train air signal
M-602-38	Gaskets, air brake hose
M-603-38	Hose, air, gas and oxygen, wrapped and braided
M-604-38	Hose, cold water, wrapped and braided
M-605-38	Hose, steam and hot water
M-606-38	Hose, tender tank
M-607-38	Rubber goods, general instructions on standard methods of test for

Specifications M-904-36, Reclaimed Car Oil

This specification has been reviewed by a joint sub-committee representing the Specifications and Lubrication Committees.

The joint sub-committee's report and recommendations applying to specification M-904-36 were covered in their report of May 12, 1938, addressed jointly to the chairmen of the Specifications and Lubrications Committees. An excerpt from this report follows:

"The Joint Sub-Committee recognized the fact that the information made available through the 1936-38 survey divides the car oils now reclaimed by the railroads in the country into four general classes:

"(1)—Those employing a washing process and treatment with caustic and separation of the dirt and impurities by settling.

"(2)—Those employing a process of distillation.

"(3)—Those employing a centrifuge or mechanical means for the removal of the dirt, followed by filtration and settling.

"(4)—Those employing filtration and settling without special chemical treatment or mechanical apparatus.

"In redrafting revised Specification M-904-38 and new Specification M-910-38 at this meeting, the joint sub-committee took cognizance of the fact that there is a clear differentiation between the degree of cleanliness of the renovated materials by the processes now in general use as indicated by the values of 'tarry matter' and 'insoluble impurities' in the case of the oils, and of the 'total impurities (incl. tarry matter),' in the case of the wastes and packings. It is apparent that it would be possible to set lower limits on the permissible impurities in car oils renovated by either the chemically treated or the distillation processes than with the centrifuged oils, and that a specification to include the oils in the fourth class (filtered and settled) would be of little or no value.

"It is further apparent that the reason for the relatively higher impurities in the oils renovated by centrifuging is due to the higher fine dirt content in this class of renovated oil. After full discussion, the joint sub-committee was of the opinion that the presence of fine dirt in the oil is detrimental and that its permissible quantity, therefore, should be limited. It was the consensus of opinion at the meeting that the presence of colloidal material in an oil *used with waste* for journal lubrication is objectionable for the reason that the finely divided material gets into the fibres of the waste and retards capillary feeding of the oil to the journal.

"It is not the desire or the intent of the joint sub-committee, however, to set the limits for the allowable impurities in acceptable renovated oil so low that they may not be realized with present mechanical equipment (centrifugal separators, etc.) now available and owned by a number of railroads. It is felt that the limits set can be met with mechanical equipment available when properly operated and controlled."

The recommendations of the joint sub-committee and the proposed specification M-904-36 were reviewed by the Committee on Specifications for Materials at a meeting held May 24 and 25, 1938. Certain changes in wording were approved by the committee as a whole, and the proposed specifications were changed accordingly by the joint sub-committee chairman. The proposed specification, M-904-38, was submitted with the report.

The discussion in the meeting of the Specifications Committee developed a minority opposition to full approval of the proposed specifications. This minority, representing railroads using mechanical process of renovating, were not agreeable to acceptance of limits set up for items (4) tarry matter, and (5) insoluble impurities (dirt), shown in Section 5 of the specifications.

A discussion of the points in question in this specification, is given in the following excerpt from the minutes of the Specification Committee:

"Discussion developed that all were in agreement with the specification, except in respect to limits shown for items (3) water; (4) tarry matter; (5) insoluble impurities (dirt), as set up in Paragraph 5, Section II—Properties and Tests. Mr. Jackson explained to the committee that the limits as set up in this specification were based on results of tests on samples of reclaimed packing and oil submitted by various members and, while it was true the results of certain samples from certain roads did not comply with the limits set up, his sub-committee felt that oil conforming to the proposed specification requirements represented an oil of desirable properties. The discussion brought out further that, apparently to meet these requirements in renovating the oil, chemical treatment would be involved. Messrs. Zeleny and Staib cited the results of centrifuging, which would not conform to the proposed limits for tarry matter and insoluble impurities, and they were in doubt as to the necessity for such low limits for these two items. Mr. Chapman advised that the Santa Fe's experience in mechanically renovating the oil was in accordance with that reported by Mr. Zeleny.

"The discussion ensuing brought out there was general agreement that fewer hot boxes apparently occurred in connection with the use of renovated oil and packing than in the use of new oil and packing—this, in particular, in cases of new brass and journal; one explanation being that the insoluble impurities acted as a polishing and burnishing agent, bringing about satisfactory conditions in respect to avoiding hot boxes. However, there was not unanimous agreement, assuming the above took place, that undue wear would not occur with continued use of the same renovated waste and oil. Messrs. Staib and Zeleny stated it was their opinion the chief benefit from renovated waste and oil was largely due to freeing and fluffing up the waste proper and removing the coarser particles from the oil.

"Another point emphasized on the part of Mr. Zeleny was the fact there is more oil lost due to using chemical means of renovating than in renovation involving mechanical methods, it being reported that, in using chemical methods, the loss was over 15 per cent more than when renovated by mechanical means, namely, centrifuging. It was also brought forth that there was a higher cost per gallon in case of renovation involving chemical treatment as compared with mechanical, but no one present had actual figures available.

"Mr. Bryant brought up the question as to the propriety of requiring such a low content for tarry matter and insoluble impurities in the new car oil specification, namely, maximum 0.10 per cent for each item, if a higher content of these two items was to be permitted in reclaimed oil, and that, if these limits were broadened in case of the new oil, undoubtedly it could be purchased at a cheaper price. To this, Mr. Zeleny replied that it costs very little more for the oil refiner working with crude oil to keep the tarry matter and insoluble impurities to the low figure, whereas it is rather expensive to do the same with used oil, and such expense is not warranted.

"Mr. Jones suggested that valuable information could possibly be obtained by a study of results of tests on reclaimed and new oil under the same conditions at the Indianapolis testing plant. it being his understanding that some tests of this character had already been carried out."

Final recommendations of the Specification Committee are that the present specification be continued in effect, and that the proposed specification M-904 be circularized among the members of the Association as information, with the request that study be given the application of the proposed requirements during the coming year; also that the Lubrication Committee be notified of this proposal, and later arrangements be made for a joint meeting to discuss the matter as a whole and attempt to reconcile the differences involved.

Proposed Specifications M-910-38. Renovated Journal-Box Waste and Packing

This specification was covered in the report of May 12, 1938, of the joint sub-committee on Specifications for Lubrication Materials, and an excerpt from this report is given above.

The proposed specification is intended to replace requirements for renovated packing, included as part of Rule 66, in the Code of Rules Governing the Condition of, and Repairs to Freight and Passenger Cars for Interchange of Traffic, the requirements in Rule 66 having been drafted in the Association standard specification form. The proposed specification M-910-38 was included as part of this report.

In case of adoption of Specification M-910-38, revision should be made in Sections 4 to 8. inclusive, of Rule 66, page 127, 1937 Revised Code of Rules. A proposed draft of such changes was included in the report. Since methods of analysis are made part of the new Specification M-910-38, Methods for Analysis of Reclaimed Waste, Section L of the Manual, page L 35-B, 1937, should be withdrawn, if and when Specification M-910-38 is adopted.

The Committee on Specifications for Materials has considered this new specification, M-910-38, and other recommendations pertaining thereto, and this Committee's recommendation is that the present requirements be maintained and that this proposed specification also be circularized among the members of the Association as information, with request that study be given the application of the proposed specification requirements during the coming year; also the Lubrication Committee to be notified of this proposal, and later arrangements be made for a joint meeting to discuss the matter as a whole, and attempt to reconcile any differences involved.

Specification for Brushes

The Purchases and Stores Division has suggested the desirability of developing uniform specifications for brushes. A subcommittee is now working on this matter.

Recommendations

The committee recommended that the above revisions in specifications, with the exception of those outlined in the case of specifications for lubrication materials, be approved for submission to letter ballot.

The report was signed by T. D. Sedwick (chairman), engineer of tests, Chicago, Rock Island & Pacific; E. E. Chapman (vice-chairman), mechanical assistant, Atchison, Topeka & Santa Fe; F. Zeleny, engineer of tests, Chicago, Burlington & Quincy; H. G. Burnham, engineer of tests, Northern Pacific; C. B. Bryant, engineer of tests, Southern; H. G. Miller, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific; H. P. Hass, engineer of tests, New York, New Haven & Hartford; J. R. Jackson, engineer of tests, Missouri Pacific; J. W. Hergenhan, assistant engineer, test department, New York Central, and L. B. Jones, engineer of tests, Pennsylvania.

The report was approved and recommendations of the committee ordered submitted to letter ballot.

Report of Arbitration Committee

With the approval of the Operating-Transportation Division, no extension in effective date beyond January 1, 1939, is recommended for requirement in Paragraph (a-8) of Rule 3, prohibiting acceptance of cars in interchange bearing advertisements of any shipper, consignee or product.

With the approval of the General Committee and the Committee on Tank Cars, the members and all tank-car owners were notified on November 22, 1937, that effective date of Paragraph (t-8) of Rule 3, prohibiting the acceptance in interchange of tank cars having head block-anchorage on and after January 1, 1939, would not be further extended. Your committee so recommends.

The Committee on Couplers and Draft Gears, in its report last year, recommended that requirement be included in Rule 3 to prohibit the use of all 5-in. by 5-in. and all former standard 5-in. by 7-in. shank couplers (except type D), effective January 1, 1942, in order to reduce the number of pull-outs and to gain the advantage of the increased strength of the standard coupler. Your committee concurs and recommends such requirements to be incorporated in Section (c) of the rule.

A time limit (January 1, 1943) is recommended for inclusion in Paragraph (t-10) of Rule 3, within which all tank cars requiring metal placard holders must be so equipped.

Modification of Rules 3, 18 and 104 is recommended in connection with adoption of specification for secondhand couplers by letter ballot last year, which are in accord with suggestions contained in the 1937 report of the Committee on Couplers and Draft Gears. Upon recommendation by the same committee, a further revision of Rule 18 is proposed, extending the present 6½-in. condemning limit for horizontally inclined cracks in knuckle wall back of knuckle tail, to 7½ in., with prohibition that coupler bodies so condemned must not be reclaimed by welding.

A car owner desiring to effect betterments or change the standard of individual parts of his cars, such as wheels, brake beams, etc., is confronted with the problem of removing serviceable parts for the purpose of making the new application. A new paragraph is recommended under Rule 16, to permit stenciling of cars for the new standard prior to application, so that during the transition period foreign lines may renew in kind or substitute the new standard as the individual parts become defective.

Another economy measure is recommended in Rule 17, to permit the substitution of one type of non-approved draft gear for another type of non-approved gear, as correct repairs, providing the gear applied conforms with the one removed as to sill spacing and coupler pocket limits.

Due to a number of accidents caused by failure of old L- and T-section cast-steel side frames, with the concurrence of the General Committee and Committee on Car Construction, revision of Rules 3, 19 and 23 have been recommended for submission to letter ballot, to prohibit welding of any description on such side frames or the application of such welded side frames to foreign cars.

All recommendations for changes in the Rules of Interchange submitted by members, railroad clubs, private car owners, etc., have been carefully considered by the committee and, where

approved, changes have been recommended. The detail recommendations are as follows:

Freight-Car Rules

Rule 2

The committee recommends that third paragraph of Section (b) of this rule be modified as follows:

Proposed form—*Any* leaky tank car, *regardless of commodity carried,* shall have stenciled on both sides, in letters three inches in size, adjacent to the car number, the words "Leaky tank. Do not load until repaired," (etc.—no other changes).

Reason—To clarify the intent that this requirement applies to all classes of leaky tank cars.

Rule 3

The committee recommends that the effective dates for various requirements in the present rule, as listed below, now set at January 1, 1939, be extended to January 1, 1940:

Section (b), Paragraph (7)—Metal badge plate showing dimensions of brake levers.

Section (b), Paragraph (8)—Bottom-rod and brake-beam safety supports.

Section (b), Paragraph (9)—Braking power

Section (r), Paragraph (3)—Hatch covers to be secured by hinges.

Also, that the effective date of Paragraph (17) of Section (t) of this rule, requiring that plugs in tanks of tank cars must be of the solid type, now set at August 1, 1938, be extended to August 1, 1939, with proviso that no further extension beyond the latter date will be granted.

Reason—The present situation justifies these extensions. The requirement for solid type plugs in tanks of tank cars was incorporated in the 1938 Code as a safety measure, to comply with revised I.C.C. Specification 103, and extension of effective date beyond August 1, 1939, would not be justified.

The committee recommends that no further extension beyond January 1, 1939, be granted for effective date of requirement appearing in Paragraph (8) of Section (a) of this rule, prohibiting the acceptance of cars in interchange bearing advertisements of any shipper, consignee or product.

Reason—Sufficient time has elapsed to permit compliance with this requirement. This recommendation has the approval of the Operating-Transportation Division.

The committee recommends that no further extension beyond January 1, 1939, be granted for effective date of Paragraph (8) of Section (t) of this rule, prohibiting the acceptance in interchange of tank cars having head-block anchorage.

Reason—This requirement has been in the rules for a number of years and sufficient time has elapsed to permit compliance therewith and that no further extension of effective date is justified.

The committee recommends that second paragraph of Section (a) of this rule be modified and a new note added, as follows:

Proposed Form—(a-2) Air brakes, location of retaining valves in accordance with A.A.R. Standard, required on all cars built new or rebuilt on or after August 1, 1933. *In interchange.*

Note—It is recommended that when cars built new or rebuilt prior to August 1, 1933, receive Class I general repairs, retaining valves be located in accordance with A.A.R. Standard.

Reason—Sufficient time has elapsed to make this provision a general interchange requirement. Note added to expedite the use of the standard location on cars built prior to August 1, 1933.

The committee recommends that third paragraph of Section (a) of this rule be modified as follows:

Proposed Form—(a-3) Air brakes, including centrifugal dirt collector, in addition to above details, required on all cars built new or rebuilt on or after August 1, 1929. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that fifth paragraph of Section (a) of this rule be eliminated.

Reason—Rules 19 and 60 cover.

The committee recommends that fourth paragraph of Section (b) of this rule be modified as follows:

Proposed Form—(b-4) Brake beams on all cars built new on or after September 1, 1909, and on all cars rebuilt on or after July 1, 1928, must be hung from the trucks. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that fifth paragraph of Section (b) of this rule be modified as follows:

Proposed Form—(b-5) Brake-beam hangers and brake-beam hanger pins conforming to A.A.R. Recommended Practice, or equivalent in strength, required on all cars built new or rebuilt on or after January 1, 1930. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that seventh paragraph of Section (b) of this rule be modified as follows:

Proposed Form—(b-7) Brake levers: Metal badge plate meeting A.A.R. requirements and fastened to underframe in an accessible location, *preferably near air-brake cylinder and on the same side of car,* showing dimensions of brake levers standard to car, required on all cars built new or rebuilt on or after August 1, 1929. Effective January 1, *1940,* the foregoing requirement will also apply to all cars. From owners.

Reason—To facilitate checking of rods and levers.

The committee recommends that new eleventh and twelfth paragraphs be added to Section (c) of this rule and included in the next supplement, to read as follows:

Proposed Form—(c-11) *Couplers, former standard or temporary standard having 5-in. by 5-in. shanks, prohibited, effective January 1, 1940, on all cars. From owners.*

(c-12) *Couplers, former standard (except type D) or temporary standard having 5-in. by 7-in. shanks, prohibited, effective January 1, 1942, on all cars. From owners.*

Reason—As recommended by the Committee on Couplers and Draft Gears.

The committee recommends that first and second paragraphs of Section (f) of this rule be combined and modified to read as follows:

Proposed Form—(f-1) Flat cars must be equipped with stake pockets 4 in. wide by 5 in. deep and have the side stake pockets spaced minimum 2 ft. and maximum 4 ft. *In interchange.*

Note.—A tolerance of ¼ in. in either dimension of the stake pocket is permissible on flat cars built prior to July 1, 1928.

(f-2) Vacant.

Reason—To shorten and simplify the rule, as dates are now unnecessary. Sufficient time has elapsed to make this provision a general interchange requirement.

The committee recommends that first paragraph of Section (h) of this rule be modified as follows:

Proposed Form—(h-1) Handbrake arrangement must be efficient on all cars. On all cars built new or rebuilt *between* March 1, 1925, *and January 1, 1937,* the braking power shall conform to the standard adopted in 1924, *or car equipped with geared hand brake complying with the requirements of the A.A.R. Specifications for Geared Hand Brakes.* In interchange.

Reason—To eliminate confliction with Paragraph (h-3).

The committee recommends that second paragraph of Section (j) of this rule be eliminated in the next supplement.

Reason—As directed by the General Committee.

The committee recommends the addition of a note to fourth paragraph of Section (r) of this rule, as follows:

Proposed Form—(r-4) Refrigerator cars, ventilated type, built new or rebuilt on or after January 1, 1935, must have hatch plugs secured by hinges. From owners.

Note.—It is recommended that when ventilated type refrigerator cars built new or rebuilt prior to January 1, 1935, receive Class I general repairs, hatch plugs be secured by hinges.

Reason—To expedite the use of hinged hatch plugs on cars built prior to January 1, 1935.

The committee recommends the addition of a note to fifth paragraph of Section (r) of this rule, as follows:

Proposed Form—(r-5) Receptacle for accommodation of defect, information and joint evidence cards, in accordance with A.A.R. Recommended Practice Specification, required on all cars built new or rebuilt on or after January 1, 1937. From owners.

Note—It is recommended that when cars built new or rebuilt

prior to January 1, 1937, receive Class I general repairs, defect card receptacle as described above be applied.

Reason—To expedite the use of defect-card receptacles on cars built prior to January 1, 1937.

The committee recommends that next to last sentence in third paragraph of Section (s) of this rule, reading *"Cars built prior to 1895 may be stenciled 'built prior to 1895' or bear badge plate giving this information,"* be eliminated.

Reason—It is conservative to conclude there are no cars in interchange service built prior to 1895.

The committee recommends that third paragraph of Section (t) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(t-3) Truck side frames, cast-steel, secondhand, must not be substituted for any other side frames (cast-steel, pressed or structural steel or arch bar type) unless entirely free from cracks, fractures, excessive wear, excessive corrosion, or porosity, or welds not performed and marked strictly in accordance with Rule 23. Secondhand side frames of older designs, such as those having T- or L-section compression or tension members, must be confined to owner's equipment and then only when such frames have been removed from same owner's equipment, or for replacements in kind on foreign cars, *and providing further that such truck frames have not been welded.*

Reason—To prohibit application of welded L- and T-types of side frames, as a safety measure, as recommended by the General and Car Construction Committees.

The committee recommends that tenth paragraph of Section (t) of this rule be modified as follows:

Proposed Form—(t-10) Tank cars: Permanent metal holders designed to provide for secure attachment, easy application, removal, or reversal of the placards prescribed by the Interstate Commerce Commission Regulations for application to tank cars, required on all new cars, on new underframes to which tanks are applied, *on* all cars receiving general repairs on or after January 1, 1932, *and on all cars after January 1, 1943,* except cars used exclusively for the transportation of non-inflammable, non-corrosive, non-poisonous and non-dangerous commodities for which the I.C.C. Regulations do not require placards. From owners.

Reason—A reasonable time limit should be established within which all tank cars requiring metal placard holders must be so equipped.

The committee recommends that second paragraph of Section (u) of this rule be modified as follows:

Proposed Form—(u-2) Underframe, etc.: No car of all-wood construction (now defined as Class F under Rule 112) will be accepted. *In interchange.*

Reason—Sufficient time has elapsed to make this provision a general interchange requirement.

Rule 4

The committee recommends that present note following Section (d) of this rule be modified and a new second note added, effective August 1, 1938, as follows:

Proposed Form—(d) Other house cars—When sheathing is split or broken, or when raked into tongue.

Note *1*—It is understood that *adjoining* raked sheathing if not split or broken will not be cardable unless raked into tongue, except that on refrigerator cars sheathing raked to bottom of bead *but not into tongue* will also be cardable *if it adjoins sheathing raked into tongue, broken or split.*

Note 2—Special type hopper cars having permanent fixed roofs (A.A.R. Class LO) shall be considered as house cars in so far as defect carding under this rule is concerned.

Reason—To more clearly define cardable raked wood sheathing and specifically classify the Class LO hopper car for defect carding purposes.

Rule 5

The committee recommends that second paragraph of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—To justify bill, repairs authorized by defect card must be made within two years from date of first receipt of car on home line, except wrong repairs, which must be corrected within nine months from date of first receipt of car on home line. However, if wrong repairs of brake hangers, bolts in place of rivets, or wrong size bolts or pins, are not corrected within nine months from date of first receipt of car on home line, *or not corrected on any line* within one year from date of such wrong repairs, *counterbill* for correcting same is prohibited.

Reason—To clarify the intent that the requirement applies to correction of wrong repairs by foreign lines as well as by car owner. Car owner should absorb expense of correction after these details have given the specified length of service.

Rule 7

The committee recommends that fourth paragraph of Section (2) of this rule be modified to read as follows:

The actual weight of forgings, structural or pressed-steel shapes and weight and kind of castings must be shown on original record in space provided, except where weight of same is accurately determined by definite description or *where arbitrary weight is specified in Rule 101 tables.*

Reason—Unnecessary to record actual weights in such cases.

Rule 9

The committee recommends that sixth item in this rule be modified as follows:

Proposed Form—Brake shoe keys, applied.—*"K-34" (indicating 1934 A.A.R. Standard)* must be shown to justify charge.

Reason—To simplify the writing of billing repair cards.

Rule 16

The committee recommends that a new third paragraph be added to this rule (present third paragraph to be relocated as new fourth paragraph), to read as follows:

When effecting betterments or in application of new standards, a car owner may stencil car "New Std." (new standard) for any part of car (such as wheels, brake beams, etc.) while making partial change or without making any change. During the transition period handling line has the option of applying parts in kind or substituting the new standard. However, when such new standard details are removed account defective, they must be renewed in kind or with permissible substitutes.

Reason—To permit application of betterments or new standards as individual parts become defective.

Rule 17

The committee recommends that first paragraph of Section (c) of this rule be modified as follows:

Proposed Form—(c-1) In replacing couplers, 9⅛-in. butt may be substituted for 6½-in. butt when used with A.A.R. standard yoke in substitution for non-A.A.R. standard yoke.

Reason—Present wording technically prohibits substitutions which Section (c-2) permits as correct.

The committee recommends that fourth paragraph of Section (c) of this rule be modified and Interpretation No. 24 eliminated, as follows:

Proposed Form—(c-4) Equipment markings (for couplers, draft gears, etc.) are not required; however, the rules do not prohibit application of such markings by car owner. If car bears previous markings for couplers, in the event of first application of D or E type coupler; *or if A.A.R. approved draft gear is applied in place of non-approved or obsolete type of draft gear, and car bears previous markings for latter gears;* such markings must be changed to correspond with coupler *or draft gear* applied (for the particular end, A or B, or both ends, as the case may be) for which a charge of ½ hour may be made. In event of failure of repairing line to correct markings under such circumstances, defect card shall be issued for ½ hour labor to cover.

(Inter. 24) Vacant.

Reason—To protect car owner in such cases.

The committee recommends that Section (d) of this rule be modified as follows:

Proposed Form—(d) Bolts substituted for rivets, where rivets are the standard of the car, are considered as improper repairs, except where used in securing ladders, ladder treads, handholds, sill steps and uncoupling-lever brackets, exclusive of the tank,

or metal jacket on tank, of tank cars, also for securing *coupler and draft gear* supports on tank cars; bolts should not be used for securing safety appliances on the tank or metal jacket of tank. (Etc., no other change).

Reason—To clarify the intent.

The committee recommends that a new fifth note be added to Section (e) of this rule and included in the next supplement, to read as follows:

Note 5—In the absence of stenciling to indicate type of brake beam standard to car, the majority class of beams under car will be considered as the standard to the car, or if two beams under car are of one capacity and two of another capacity, the heavier type beam will be considered as the standard to the car.

Reason—As a guide to repairing line when renewing brake beams.

The committee recommends that a new sixth note be added to Section (e) of this rule and included in the next supplement, to read as follows:

Note 6—Brake beams having more than one class number cast on strut shall be classified under the lowest class marking for charge and credit purposes.

Reason—Conflicting class number markings on brake beams are not contemplated under the A.A.R. specifications.

The committee recommends that fifth paragraph of Section (i) of this rule be modified as follows:

Proposed Form—(i-5) Where one type of non-approved friction draft gear is substituted for another type of non-approved gear, defect card *is not required if the gear applied conforms to the one removed as to sill spacing and coupler-pocket limits; but if it does not so conform, defect card must be issued for labor and material of correcting.*

Reason—It appears to be unnecessary labor and expense to remove one type of serviceable non-approved draft gear in order to replace it with another non-approved type, where sill spacing and coupler pocket limits properly conform.

The committee recommends that Section (k) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(k) Extra heavy pipe fittings may be substituted for single-weight type, or vice versa, as correct repairs, and charge based on type of fittings applied, *except for hand rails on tank cars where charge must be confined to single-weight pipe and pipe fittings if standard to car.*

Reason—It is felt that single-weight pipe and fittings for hand rails on tank cars are a proper exception to this requirement.

Rule 18

The committee recommends that this rule be modified, effective August 1, 1938, to read as follows (bracketed "Owner Responsible"):

Rule 18. *Gage Limits For and Methods of Gaging Couplers.*

(a) *Worn Limit—Repairs (Without Removing Coupler From Car).*

(1) Couplers, types D and E, with distance between point of knuckle and guard arm exceeding 5 5/16 in. as measured by gage (Fig. *A*, present Rule 18), must have the defective part or parts renewed to bring coupler within *required* gage *of 5⅛ in. as measured by gage (Fig. B, present Rule 18). If coupler is out of gage. the body must not be renewed unless the application of secondhand, reconditioned or new knuckle, lock and pin, any or all, will not bring it within the required gage of 5⅛ in.*

(2) Couplers, other than types D and E (M. C. B.-1904 contour), with distance between point of knuckle and guard arm exceeding 5⅛ in., measured perpendicularly to guard arm (Fig. *B, present Rule 18*), must have the defective part or parts renewed to bring coupler within *required* gage *of 5⅛ in.*

Note.—The 5⅛-in. limit referred to should not be confused with the 4⅞-in. limit applicable to reclamation of knuckles as covered on pages 479-506 of the 1932 Mechanical Division Proceedings and referred to in Rule 23.

(b) *Application—Secondhand or Reconditioned Couplers.*

(1) *Coupler bodies, types D and E, secondhand or reconditioned, whether applied separately or as part of a complete secondhand coupler. regardless of any new, reused, reconditioned, or other secondhand parts (knuckle, lock and pin, any or all)*: Distance from point of knuckle to guard arm must not exceed 5 in. *as measured by gage. (Fig. B, present Rule 18.)*

(2) In the application of secondhand or reconditioned coupler bodies or complete coupler, the shank shall be not less than 21 in. in length from striking horn to crest of worn surface of butt, nor less than 3⅞ in. from pulling (rear) surface of horizontal key slot to crest of worn surface of butt, established with parallel straight edges; otherwise, such body shall be charged at scrap value. (See Fig. *D, present Rule 18.*) Coupler bodies having such minimum dimensions shall not be removed from cars for these defects alone, but if removed for other reasons and are otherwise in serviceable condition same shall be credited at secondhand value, with no allowance for expense of reclamation.

(c) *Coupler Bodies—Removal from Foreign Cars.*

Coupler bodies. Types D and E, with cracks in knuckle side wall back of knuckle tail, shall not be removed from foreign cars, unless

(1) Such crack extends beyond an area 3 in. above and 3 in. below the horizontal center line of knuckle side wall and 7½ in. back of front edge of knuckle side wall. *When crack extends beyond this area, the coupler body is condemned and must not be reclaimed by welding.*

(2) Section is broken out within this prescribed area whose greatest dimension exceeds three inches.

Reason—As recommended by the Committee on Couplers and Draft Gears and to harmonize with Specification for Secondhand Couplers adopted by letter ballot.

Rule 19

The committee recommends that item reading *"Pressed steel journal boxes, except when replaced in kind"*, be eliminated from this rule (which specifies material that must not be used in making repairs to foreign cars), effective August 1, 1938.

Reason—To conform with change in Paragraph (j-2) of Rule 3.

The committee recommends that a new item be added to this rule, effective August 1, 1938, to read as follows:

Cast-steel truck side frames having 'T'- or 'L'-section compression or tension members, which have been welded.

Reason—To prohibit the application of such welded side frames to foreign cars, as recommended by the General and Car Construction Committees.

The committee recommends that a new item be added to this rule, effective August 1, 1938, to read as follows:

Cast-iron wheels below nominal weight or having no cast weight.

Reason—To be consistent with other prohibitions and harmonize with Rule 83.

Rule 22

The committee recommends that sentence *"Draft timbers must not be spliced"*, be eliminated from first paragraph of this rule, account obsolete construction.

Rule 23

The committee recommends the addition of a new item to Section II of this rule, which is headed "Welding cracks or fractures (by autogenous or other method) will not be permitted on the following", effective August 1, 1938, to read as follows:

Cast-steel truck side frames having 'T'- or 'L'-section compression or tension members.

The committee recommends modification of seventh item and the addition of a new eleventh item under Section III of this rule, which is headed "Building up worn surfaces will be permissible on the following", effective August 1, 1938, as follows:

Proposed Form—†Truck sides, bolsters and column castings, *other than truck sides having T- or L-section compression or tension members.*

No welding of any kind, or building up of worn surfaces, is permitted on cast-steel truck side frames having T- or L-section compression or tension members.

The committee recommends modification of second item under Section IV of this rule, which is headed "Welding cracks or fractures will be permitted on the following", effective August 1, 1938, as follows:

Proposed Form—*Cast-steel truck sides, bolsters and transoms, *other than truck sides having T- or L-section compression or tension members.*

Reason—To prohibit welding of L- and T-types of side frames,

as a safety measure, as recommended by the General and Car Construction Committees.

Note—Figure 5 of this rule, illustrating welds made in journal box of 'T'-section truck side frame, will be revised to show the 'U'-section side frame.

Rule 32

The committee recommends that a new last paragraph be added to this rule, effective August 1, 1938, to read as follows:

11. Damage to containers on container cars will be subject to the same rules as the carrying car where damage occurs at same time and is associated with handling- or delivering-line damage to the car. However, containers missing from cars in interchange are not cardable. In the case of exterior fire damage to a container where no evidence of same appears on the car, if handling line has knowledge of same occurring while in its possession, it should assume responsibility.

Reason—To provide protection for containers of container cars.

Rule 49

The committee recommends that last sentence of Paragraph (a) of this rule be modified as follows:

Proposed Form—Where receptacle is used, same should be in accordance with A. A. R. Recommended Practice specification, applied one per car, preferably located as follows, or *as near center of car as possible but not more than 24 in. from side sill, to provide easy access and conserve time in transportation yards: However, in no case should it be located* more than 5 ft. 6 in. from top of rail.

Reason—To provide for more uniform location of receptacle.

The committee recommends that note following third paragraph of Section (a) of this rule be modified as follows:

Proposed Form—Note—Suitable receptacle referred to above may not be *initially* applied to *or relocated on* foreign cars except with consent of *car* owner.

Reason—To clarify the intent and authorize renewal in kind where standard to car.

The committee recommends that Paragraph (c) of this rule be modified as follows:

Proposed Form—(c) All-steel and steel sheathed refrigerator cars not equipped with cardboards for special explosive and other placards, as required by the I. C. C. Same to be located on side doors and both ends of car. *This requirement also applies to ends of box and refrigerator cars having metal ends and wooden sides.* (On refrigerator cars, they shall be located adjacent to side doors but must not be concealed when doors are in open position.) Size not to be less than 16 by 24 in.

Reason—As required by the I. C. C. Regulations when such cars are used for the transportation of explosives and other dangerous articles.

Rule 59

The committee recommends that last paragraph of this rule be modified by the addition of italicized portion below, and new interpretation added, to read as follows:

Missing steam-heat hose or air signal hose, complete, *also missing end steam valves and metallic steam connectors,* where cars are stenciled that they are so equipped.

(Inter. 3) Q.—Where elbow or other pipe fitting is used in place of the end steam valve (on car stenciled for the latter), is this a delivering line defect in interchange on basis of missing end steam valve, or is it considered as wrong repairs for which only the road applying is responsible to car owner?

A.—In such case it should be considered as delivering line defect in interchange on basis of missing end steam valve.

Reason—To protect car owner where cars are stenciled for these items.

Rule 64

The committee recommends that note following this rule be modified in the next supplement, as follows:

Proposed Form—Note—It will be understood that the above provision also applies when such bolts are renewed. *Joint evidence as per Rule 12 must be used to establish claim of wrong repairs.*

Reason—To clarify the intent as to handling of such cases.

Rule 76

The committee recommends that this rule be modified to read as follows, changes from the present rule being italicized:

Rule 76. Tread worn hollow—cast-iron and *one-wear* cast-steel wheels: If the tread is worn so that projection on under side of gage does not come in contact with tread of wheel (see Fig. 4-D). See paragraph 110 and Fig. 92 in Wheel and Axle Manual.

Tread worn hollow—wrought-steel *and multiple-wear cast-steel wheels:* If height of flange is 1½ in. or over, as measured with standard steel-wheel gage (see Fig. 128 in Wheel and Axle Manual), or approved equivalent.

Reason—Gage shown in Figure 128 in the Wheel and Axle Manual is not applicable to the one-wear cast-steel wheel, but is applicable to multiple-wear cast-steel wheels; as recommended by the Committee on Wheels.

Rule 82

The committee recommends that first paragraph of this rule be modified to refer to remount limits a, b, c *and d,* and that a new paragraph (d) be added to read as follows:

(d) Rim broken: Cast-iron or cast-steel wheels removed from service account condition of axle or mate wheel, shall be classed as scrap if width of tread, measured from flange at a point 5/8 in. above tread, is more than 3½ in. but not more than 3¾ in. and the fracture inclines outwardly.

Reason—Wheels having such defect should not be remounted, as recommended by the Committee on Wheels.

Rule 86

The committee recommends that second and third paragraphs of Section (b) and last paragraph of Section (d) of this rule be eliminated.

Reason—Account obsolete. Rule 3 requires A. A. R. Standard axles on all cars in interchange.

Rule 87

The committee recommends that third sentence in Paragraph (a) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—However, if wrong repairs of brake hangers, bolts in place of rivets, or wrong size bolts or pins, are not corrected within nine months from date of first receipt of car on home line, *or not corrected on any line* within one year from date of such wrong repairs, *counterbill* for correcting same is prohibited.

Reason—To harmonize with changes in Rules 5 and 94.

Rule 88

The committee recommends that first paragraph of this rule be modified as follows:

Proposed Form—Rule 88. In order that repairs of owner's defects may be expedited as fully as possible, foreign or private line cars may be repaired by the handling line by using material from their own stock instead of ordering from owner special material not specified in last paragraph of Rule 122, in which event the repairing line must issue its defect card for the labor only of correcting such improper repairs, and defect card should be so marked; except *as otherwise provided in Rule 17, and in cases where* the following substitutions are made defect card must be issued for material and labor of correcting, regardless of responsibility for the repairs:

Reason—Account change in Rule 17, Paragraph (i-5).

Rule 94

The committee recommends that second sentence of first paragraph of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—However, if wrong repairs of brake hangers, bolts in place of rivets, or wrong size bolts or pins, are not corrected within nine months from date of first receipt of car on home line, *or not corrected on any line* within one year from date of such wrong repairs, *counterbill* for correcting same is prohibited.

Reason—To harmonize with changes in Rules 5 and 87.

Rule 98

The committee recommends that first paragraph of Section (c) of this rule be eliminated.

Reason—Obsolete. Rule 3 requires A.A.R. Standard axles on all cars in interchange.

The committee recommends that reference in fifth paragraph of Section (c) of this rule to Rule 70 (c), be modified to refer to "Rules 70 (c), *73 (a) and 83,*" to harmonize with the latter rules.

Rule 101

The committee recommends that note preceding Item 69 of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—Note—The following prices for extra-heavy pipe fittings may be charged, regardless of kind of fittings removed, *except for hand rails on tank cars where charge must be confined to single-weight fittings if standard to car.*

Reason—Account change in Section (k) of Rule 17.

The committee recommends that Items 201, 202 and 203, which specify prices for non-A.A.R. axles, be eliminated, account absolete. Rule 3 requires A.A.R. Standard axles on all cars in interchange.

The committee recommends that a new third note be added following Item 213 of this rule, effective August 1, 1938, to read as follows:

Note 3—Brake beams having more than one class number cast on strut shall be classified under the lowest class marking for charge and credit purposes.

Reason—Conflicting class number markings on brake beams are not contemplated under the A.A.R. specifications.

The committee recommends that second sentence of Friction Draft Gear Note, preceding Item 250 of this rule, be eliminated.

Reason—Account changes in Rules 17 and 88.

Rule 104

The committee recommends that Sections (a), (b), (e), (f) and (l) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(a) (1) Secondhand A.A.R. type E couplers of rigid, swivel or radial design, shall be charged and credited at 75 per cent of value new. Credit shall be allowed for all parts of such couplers.

(2) Secondhand A.A.R. type D couplers of rigid, swivel or radial design, shall be charged and credited at *60 per cent of* value new (except that the swivel yoke, butt casting and pin or radial butt casting, shall be charged and credited at 75 per cent of value new). Credit shall be allowed for all parts of such couplers.

(3) Secondhand former standard or temporary standard couplers or parts of same shall be charged and credited at *30 per cent* of value new. Etc.

(b) Secondhand swivel yokes, butt castings and pins or radial butt castings; also, secondhand cast-steel yokes of other types having 24⅝-in. pocket spacing and secondhand two-key forged yokes having 24⅝-in. pocket spacing, designed for 1½-in. by 6-in. horizontal cross keys; shall be charged and credited at 75 per cent of value new.

(e) (Eliminate.)

(f) In the case of missing material under Rule 95, and permissible substitutions are made per Rule 17, car owner may be charged or credited with any difference between value of new or secondhand material applied and the secondhand value of missing material. Etc.

(l) (7) Coupler yokes, except as provided in Section (*b*).

Reason—To adjust secondhand allowance for older types of coupler commensurate with the expense of reclamation, as recommended by the Committee on Couplers and Draft Gears.

Rule 107

The committee recommends that the wording of Item 243 of this rule be modified as follows:

Proposed Form—243. Stenciling car or altering stenciling, to show A.A.R. type D or E coupler applied *or approved draft gear applied,* per car, net.

Reason—Account change in Rule 17.

Rule 108

The committee recommends that the following item be added to Section (a) of this rule, effective August 1, 1938: *Turnbuckles, tightened (other than body truss rods).*

Reason—It is felt no charge should be permitted for this operation.

Rule 112

The committee recommends that seventh paragraph of Section B of this rule be modified as follows:

Proposed Form—(B-7) A steel superstructure frame *house or open-top* car (*Class B*) is a *steel underframe* car having *side-sill members, top side members, uprights and diagonal upright braces, all steel and all* riveted *or welded* together.

Reason—To more clearly define this type of car and indicate its application to certain classes of open-top cars as well as house cars.

Passenger Car Rules

Rule 4

The committee recommends that the effective date of second paragraph of this rule, with reference to equipping all-steel or steel-underframe cars with cardboards or suitable receptacle for the accommodation of defect and joint evidence cards, now set at January 1, 1939, be extended to January 1, 1940.

Reason—The present situation justifies this extension.

Rule 7

The committee recommends that Paragraph (4) of Section (f) of this rule be modified to read as follows, changes from the present rules being in italics:

(f-4) Tread worn hollow—cast-iron and *one-wear* cast-steel wheels: If the tread is worn so that projection on under side of gage does not come in contact with tread of wheel. (See Fig. 4-D of freight code).

Tread worn hollow—wrought-steel *and multiple-wear cast-steel* wheels: If height of flange is 1½ in. or over, as measured with standard steel-wheel gage (see Fig. 128 in Wheel and Axle Manual), or approved equivalent.

Reason—Gage shown in Fig. 128 in the Wheel and Axle Manual is not applicable to the one-wear cast-steel wheel, but is applicable to multiple-wear cast-steel wheels; as recommended by the Committee on Wheels.

The committee recommends that Paragraph (1-a) of Section (h) of this rule be modified, effective August 1, 1938, as follows:

Proposed Form—(a) Such crack extends beyond *the shaded* area shown in Figure *D* of Freight Rule 18 (3 in. above and 3 in. below the horizontal center line of knuckle side wall and *7½ in.* back of front edge of knuckle side wall). *When crack extends beyond the shaded area, the coupler body is condemned and must not be reclaimed by welding.*

Reason—To harmonize with change in Freight Rule 18, as recommended by the Committee on Couplers and Draft Gears.

Rule 8

The committee recommends that a new Item 17 be added to Section (a) of this rule (Delivering line defects), to read as follows:

(17) *Raked sheathing to be cardable if raked to extent shown in Freight Rule 4 for refrigerator cars.*

Reason—It is felt the same limits as provided in Freight Rule 4

should apply for carding raked sheathing on passenger equipment cars.

RULE 15

The committee recommends that a new third paragraph be added to this rule, to read as follows:

In replacing generator belts or brake shoes on foreign cars, new material must be used to justify bill.

Reason—It is felt new material should be applied in such cases to warrant charges versus car owner.

RULE 18

The committee recommends that this rule be modified, effective August 1, 1938, as follows:

Proposed Form—Rule 18. Settlement for passenger equipment cars destroyed shall be based on cost of reproduction in kind at date of destruction. Depreciation shall be *computed* at 3 per cent per annum (straight depreciation basis) from date originally built, *except that depreciation on that portion of the cost charged to capital account for air conditioning system on cars so equipped shall be computed at 5 per cent per annum from date of installation.* Depreciation shall not exceed 80 per cent of reproduction cost.

Note.—In cases where air-conditioning system was installed coincident with construction of car, the amount charged to capital account for such installation may be estimated.

Reason—To provide an equitable settlement basis for the detail specified.

The report was signed by W. H. Flynn (chairman), general superintendent motive power and rolling stock, New York Central; J. P. Morris (vice-chairman), Atchison, Topeka & Santa Fe; J. A. Deppe, superintendent car department, Chicago, Milwaukee, St. Paul & Pacific; L. Richardson, mechanical assistant to vice-president and general manager, Boston & Maine; M. F. Covert, general superintendent equipment, General American Transportation Corp.; G. E. McCoy, assistant general superintendent car equipment, Canadian National; A. E. Smith, vice-president, Union Tank Car Company; R. G. Bennett, general superintendent motive power, Pennsylvania.

The report was adopted.

Lightweight De Luxe Coaches for the New York Central

Two stainless-steel welded units for main-line service have overall length of 79 ft. 10 in. and weigh 98,200 lb.

DURING the latter part of May the New York Central placed in main-line service two de luxe streamline, air conditioned coaches built by the Edward G. Budd Manufacturing Company, Philadelphia, Pa. The cars are non-articulated, are of streamline design without exterior buffer closure at the car ends, and have a length coupled, of 79 ft. 10 in. The width of the cars over the side rails is 10 ft. 3/8 in. with an inside width of 9 ft. 3 1/8 in. The maximum height from the rail is 13 ft. 6 in. and the height to the top of the cork floor is 4 ft. 3 1/4 in. The trucks are placed on 54-ft. centers and the truck wheelbase is 9 ft. The weight of the car in working order, without passengers, is 98,200 lb.

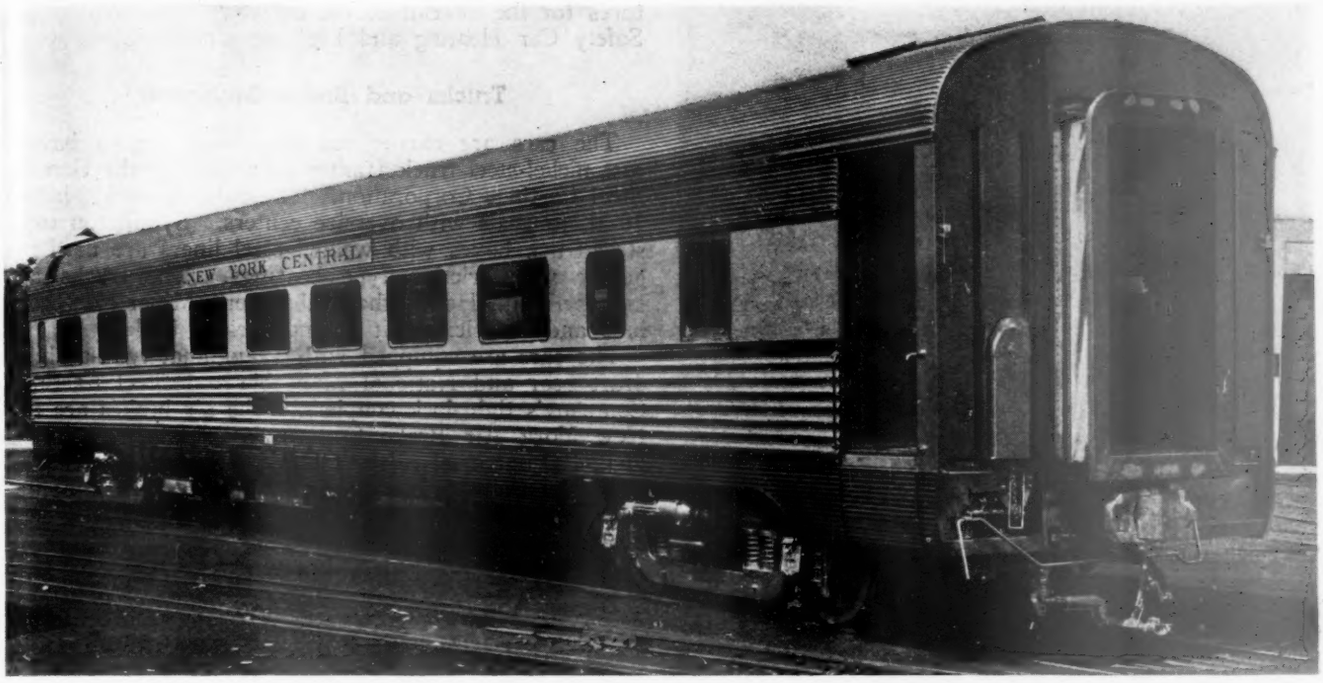
The Ladies' Lounge

The structure and sheathing are of stainless steel fabricated by the Budd Shotweld process. All of the structural parts of the car body are of 18-8 high-tensile stainless steel. A material having an ultimate strength of 150,000 lb. per sq. in. is used. Some of the non-structural parts of the cars, such as framing for partitions, are carbon steel.

The two cars are identical and the passenger carrying section of each is equipped with rotating reclining-back seats for the accommodation of 52 passengers; 13 double seats on each side of the aisle. A ladies' lounge is located at one end of the car with a men's lounge at the opposite end. Entrance is through a vestibule at one end of the car. The vestibule steps are of the folding type which, in closed position, continue the contour of the skirt.

The roof and skirts of these cars are corrugated strips welded to the car frame. The deadlight panels are sound-deadened flat sheets. The sub-floor in the passenger section consists of corrugated stainless steel with the corrugations filled with corked strips laid in cold mastic. This is covered with 1-in. cork board cemented with mastic. All of the openings in the car structure are caulked to prevent the infiltration of dust. The car structure—roof, sides, ends, and floor—are insulated with Stonefelt of 2-in. and 3-in. thickness, depending on the location. The interior lining is 3/16 in. Masonite Presdwood.

The main side windows are the Pittsburgh Plate Glass Company's double glazed dehydrated units with aluminum frame set flush with the car sides. The outside glass in the sash is Crystalex and the inside is laminated Crystalex and Violex safety glass. All window sash and glass in



One of the New York Central Lightweight De Luxe Coaches

doors is applied with a special rubber moulding supplied by the Hunter Sash Company, Inc.

Interior Finish and Decoration

The interior of these cars is finished with a synthetic eggshell enamel. In the passenger section the wainscot, pier panels and baggage racks are a deep gray blue. The ceiling is finished in old ivory and the window sills are of ebonized birch. The flashings are of stainless steel.

The walls in the men's lounge are painted in a dark nut pine color and the ceilings in a lighter shade of the same color. In the women's lounge the walls and ceilings are finished in two shades of mock orange; the lighter shade being used on the ceiling. The passageways, both walls and ceilings, are finished in two shades of gray blue, the lighter being used on the ceilings. The floor covering in the passenger section consists of $\frac{3}{16}$-in. Armstrong linoleum; Jaspe gray under the seats and plain gray in the aisle. The solid color of the aisle is broken up by a large rectangular pattern containing three squares. The rectangular pattern is of ivory Linotile and the square inserts are terra cotta. Between the gray field of the aisle and the color under the seats, there are two stripes running the length of the passenger section; one of chocolate, $4\frac{1}{2}$ in. wide, and the other 1 in. terra cotta.

The same linoleum is used for floor covering in both women's and men's lounges, the Jaspe gray being the color used in the women's lounge combined with plain

The Interior of the Passenger Section—The Seats are the Rotating Type With Reclining Backs and Each Seat Location is Lighted by Individually Controlled Lights in the Under Side of the Baggage Racks

The Furniture in the Men's Lounge is Upholstered in Brown Leather

dark gray stripes, while the Jaspe gray is used as a field color with chocolate and terra cotta stripes. The vestibule floor covering is a French gray sponge-backed rubber.

All of the 26 double seats in the passenger section are Heywood-Wakefield rotating, reclining type. The seats are fitted with Dunlopillo cushions upholstered with henna-colored mohair fabric furnished by the L. C. Chase Company. The ladies' lounge is furnished with three arm chairs and one dressing-table chair of Karpen design with spring-cushion backs and Dunlopillo cushions. The chairs are upholstered in blue mohair frieze. The furnishings of the men's lounge consist of a bulkhead seat upholstered in brown leather and one arm chair upholstered in a similar material.

Air-Conditioning and Electrical Equipment

The air-conditioning equipment is the Frigidaire electro-mechanical type of seven-tons capacity. The compressor is driven by a 10-hp. 72-volt d. c. motor while the cars are in service. For stand-by service a 15-hp. 220-440-volt a. c. motor is used. The heating system is the Vapor type with fin copper-tube radiators on the side walls and in the overhead air-conditioning unit. The entire heating and air-conditioning system is regulated by Vapor correlative thermostatic control which maintains the inside temperature at a definite relation to atmospheric temperature. Power for air conditioning and lighting is supplied by a Safety 20-kw. generator driven by a Spicer mechanical drive. The batteries consist of 32 cells, Exide 64-volt units having a total of 600 amp. hr. capacity.

Lighting

The main lighting in these cars is supplied from ceiling fixtures which give a soft effect, while individual lights are recessed in the baggage racks over the center of each double seat. The individual lights are controlled by separate switches. The center ceiling lights in the passenger section are seven in number and each fixture contains three units, two 15-watt and one 10-watt. The 26 side ceiling lights over the seats each contain one 40-watt unit. The men's and ladies' lounges are lighted by side and ceiling lights; four units being located in the men's lounge and six in the ladies' lounge, each of these units is equipped with a 25-watt bulb. The lighting fixtures for the interior of the car were furnished by the Safety Car Heating and Lighting Company.

Trucks and Brake Equipment

The cars are carried on four-wheel trucks having cast nickel-steel truck frames furnished by the General Steel Castings Corporation. The axles have 5½-in. by 10-in. journals with oversize centers. Symington cast-steel truck boxes with welded steel liners are used together with friction type bearings. The trucks are equipped with Houde shock absorbers, Miner side bearings and Simplex Unit Cylinder clasp brakes.

The cars are equipped with Waughmat twin-cushion draft gear and National Malleable and Steel Castings Company's tight-lock couplers. The air brakes are the New York Air Brake Company's equipment using a U-12-BD universal valve. All air, steam and water piping under the cars is copper tubing with sweat type fittings. The hand brakes were supplied by the National Brake Company.

Ten Articulated Locomotives for the D. & R. G. W.

(*Continued from page 44*)

White sanders. The locomotives are fitted with air signal and steam-heat equipment so that, if desired, they may be used in passenger-train service. Barco flexible joints are used on the air signal and steam lines between the engine and tender.

Lubrication

Locomotives of this size present an unusual problem in lubrication. On these the lubrication system comprises three types: The self-contained lubrication for the roller-bearing axle boxes on the trucks and drivers; the mechanical lubrication, under pressure, for the major parts of the machinery, and the pressure grease lubrication. The latter consists of the use of the Alemite system on rods, crosshead pins and trailer truck radius bar seat. The mechanical lubricating system consists of six Detroit Model A lubricators of 30 pints capacity, three for each unit. Two lubricators on each unit are mounted on the left side and one on the right side and all are driven from the valve motion. Through the medium of 40 lubricator feeds, 17 two- and four-way oil dividers and 86 oil lines, the oil is fed to the valves and cylinders, main guides, valve-stem crosshead guides, lead changers, driving- and engine-truck-box pedestals, engine-truck center pin, articulated hinge pins, waist-bearer saddle, ball and expansion joints in steam and exhaust pipes and the radial buffer between the engine and tender. There is also one Chicago K-23 hydrostatic lubricator of three pints capacity in the cab for the feed-water pump and stoker engine, and flange lubricators for the leading drivers of each unit.

The tender is of the rectangular type, having a cast-steel water-bottom frame furnished by the General Steel Castings Corporation and a riveted tank. The water capacity is 20,000 gallons and the coal capacity 26 tons. The General Steel Castings six-wheel tender trucks with cast-steel frames, swing bolsters and top equalizers are used. The tender-truck axles are fitted with SKF roller bearings. The tender-truck brakes are of the clasp type furnished by the American Steel Foundries. The draft gear at the rear end of the tender is Cardwell-Westinghouse type N. Y.-11-E.

New Devices . . .

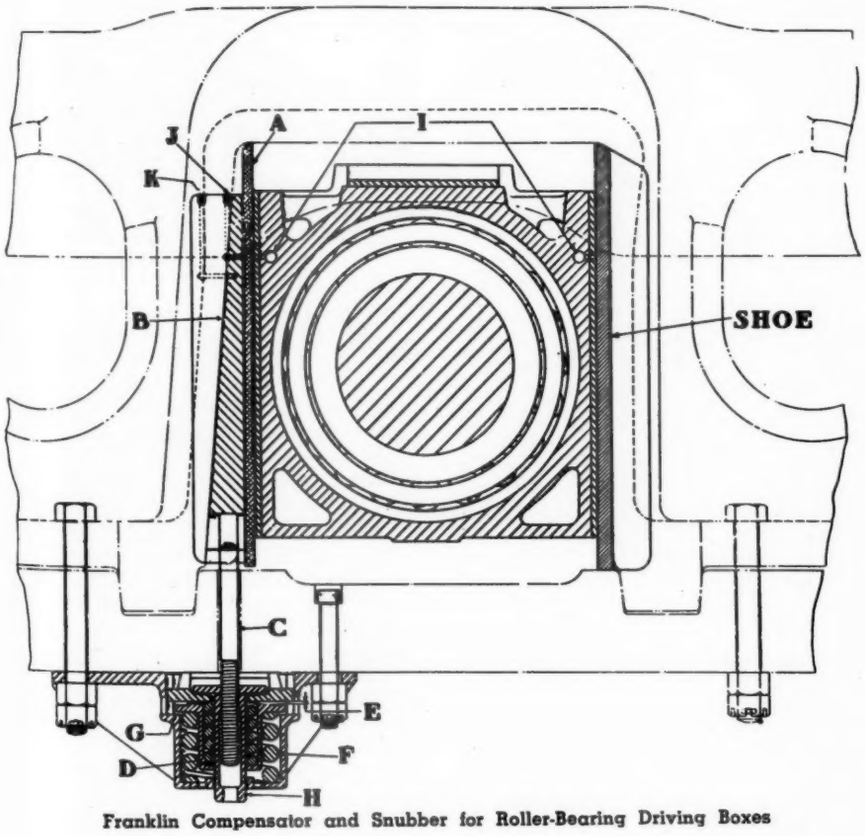
Compensator for Roller-Bearing Driving Boxes

A compensator and snubber for roller-bearing driving boxes, an assembly of which is shown in the drawing, has been developed by the Franklin Railway Supply Company, New York. It was designed to eliminate the air gap or lost motion, fore and aft of the driving box; to compensate automatically for the wearing of wedges, shoes and box faces; and to take care of the thermal expansion and contraction of the driving box without interfering with the normal up-and-down movement of the driving box in its relation to the frame. Test installations of the device have been made on locomotives which have run many hundreds of thousands of miles.

Referring to the drawing, *A* is a parallel floating plate under compression between the compensator *B* and the box face, and is able to move up and down a predetermined amount with the box when such box movement occurs. The spring *D* holds the compensator *B* in the position shown. As expansion of the box occurs, the compensator *B* is forced downward, being resisted by the spring *D* and this spring offers the only resisting force, until the preliminary stop *E* is reached. This spring is of ample strength to hold the compensator in place under all normal loadings to which it is subjected. However, in the case of abnormal thrusts, the compensator is pushed downward until the preliminary stop *E* has been reached. By this means the air gap is eliminated automatically, and expansion and contraction, as well as the effect of reversal loads is cared for. In the event that forces of undetermined and unexpected intensity develop, the spring *F*, which is preloaded, will come into play after the compensator has come in contact with the preliminary stop *E*. This spring provides a snubbing action against further movement and cushions and softens the effect of this blow.

As wear develops between the box and its surrounding members, the compensator *B* rises relative to them, being urged upward by the spring *D*, and the parallel floating plate *A* is moved transversely in relation to the box.

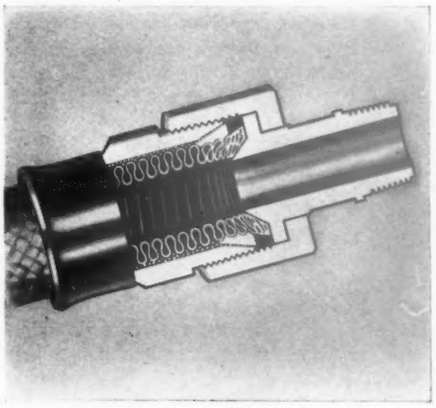
However, due to the fact that the air gap has been eliminated, this wear is entirely normal in character, and is not as rapid as would be the case if the air gap existed. Such wear can readily be compensated for by readjustment of the mechanism, through the adjusting means *H*. This readjustment restores the original and desired travel for the compensator *B* before it makes contact with the preliminary stop *E*. A permanent mechanical stop to limit the snubber movement is also provided by *G*. The holes *I* are the places on the box where the mechanical lubricator leads are attached for lubricating the front and rear faces of the driving box; *J* is the place where the mechanical lubricator leads are attached for lubricating the working surfaces of the compensator and parallel plate, and *K* is for the lubricator lead for the rear face of the compensator and the flanges of the compensator against the pedestals.



Franklin Compensator and Snubber for Roller-Bearing Driving Boxes

Flexible Metal Hose and Union Couplings

There are an increasing number of places where flexible metal hose can be used to advantage for conducting air, oil and steam on locomotives. This is due to the increasing popularity of centralized pressure lubrication and pneumatic and steam control systems on locomotives. Two products, the illustrated detachable packless, solderless and brazeless couplings, and metal flexible hose, have been developed for this service by the Packless Metal Products Corporation, New York.



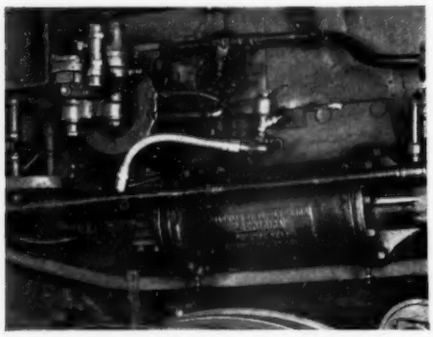
Packless Solderless and Brazeless Coupling for Flexible Hose

To assemble the couplings and hose, simply cut the hose to length with a hack saw, slip the back part of the coupling on the hose, push the braid back and screw on the threaded split ring the required distance, bring the back part of the fitting up against the split ring, place in a vise and tap the end of the hose (compressing the corrugations that extend beyond the split ring), place the cone end of the stem on the end of the hose, and screw the union nut on the back part of the coupling, holding the stem from turning when the nut is screwed on. For a union effect, loosen the nut slightly to allow the stem to swivel for making the connection (do not take the nut off). When tightening the nut, the back part of the coupling should be held from turning so as not to twist the hose.

The couplings and hose are available in a wide range of sizes suitable to withstand high temperatures and high pressures as well as corrosive conditions.

Packless seamless flexible metal hose is fabricated from high-tensile seamless bronze tubing, by methods of reducing and annealing which eliminate undue distortion of the metal. The helical corrugations distribute the stress and strain throughout the entire length of the hose.

Open or normal-pitch hose should be used for vibration only, while close-pitch hose is used where flexibility is required. For high pressures and pulsations Packless Metal Products Corporation has developed



Flexible-Hose Application on a Power-Reverse-Gear Line

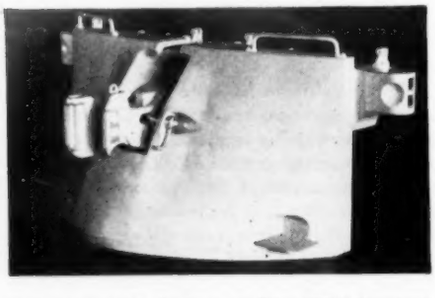
a double-wall or two-in-one heavy-duty hose.

Most important is the proper installation of flexible metal hose in order to obtain the best results, as well as correct specifications of size, length and required construction, depending on the nature of the installation. The following are some of the places where flexible hose is being used to advantage on locomotives: Booster, brake-cylinder, equalizer reservoir, lubricator, electric generator, train, signal and power-reverse-gear lines.

Lift-Coupler Type of Deflecting Pilot

The General Steel Castings Corporation, Granite City, Ill., recently developed a deflecting pilot which has been applied to thirty 4-8-4 locomotives recently built by the Baldwin Locomotive Works, for the Chicago, Milwaukee, St. Paul & Pacific. The pilot consists of a one-piece cast-steel frame which is usually covered with plate steel to present a smooth rounded surface, thus lending itself to streamlining of the locomotive. In the non-operating position the coupler head swings upward, the coupler shank being so designed as to close up the opening and conform to the shape of the pilot.

This is one of several types of deflecting pilots developed by the General Steel Castings Corporation in order to protect locomotives and trains from collision with trucks and automobiles and other large objects on the track. The usual type of pilot was of insufficient strength to deflect objects on the track and with the projecting coupler formed a pocket or wedge which held such objects and permitted them to fall under the front wheels of the locomotive, causing serious derailments and much damage.

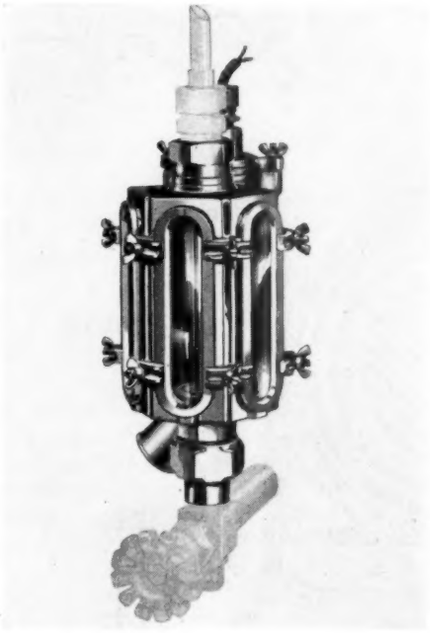


Commonwealth Deflecting Pilot With Vertical Swing Coupler in Operating Position

Safety Protector for Tubular Water Glass

The water-glass protector shown in the illustration is so designed that when the tubular water-glass bursts steam and water cannot exhaust out of the protector, thus making it safe for the enginemen to close the water-glass cocks. The protector glass panels are made of tempered glass which are held against gaskets by lugs and thumb screws. These protectors are available in two or three panel designs and can be had in 6 in., 7 in., or 8 in. clear reading. The panels are so arranged that the engineer and fireman may each have a clear view of the water in the glass from his proper position in the cab.

A large drain opening is provided for the draining of broken particles of tubular glass and for the exhausting steam and water. The drain outlet from the protector is connected to the drain pipe which extends below the cab floor by means of a metallic flexible connection.



Okadee Safety Water-Glass Protector

The safety protector, manufactured by the Okadee Company, Chicago, guards against personal injuries of the engineman from flying glass, steam and scalding water in the event of the tubular glass bursting. These protectors can be furnished to fit present water-glass mountings without expensive alterations.

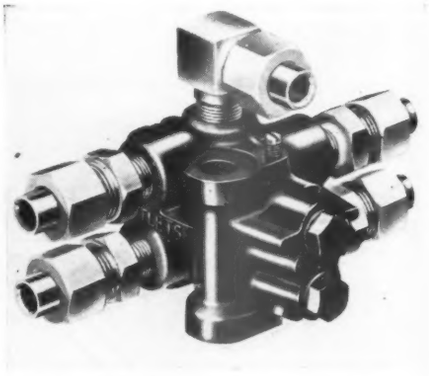
Forged-Steel Unions For Air Pumps

A line of forged-steel air-pump unions constructed for high-pressure lines subject to piping strains, vibration, and expansion and contraction, such as are encountered in locomotive service, is announced by Crane Co., Chicago. These unions conform to the specifications and recommended practice of the A. A. R. for 300-lb. air-pump unions.

These unions supplement the line of unions already listed in the Crane No. 52 catalog, and are made in reducing sizes with male and female ends, the male ends being larger than the female. The brass-to-steel ground-joint seat is noncorrodible and is designed to hold pressure without the use of a gasket. The unions can be taken apart and reassembled repeatedly without affecting strength or tightness.

Oil Feed Divider For Lubricator Lines

Lubrication facilities for 10 D. & R. G. W. locomotives built by the Baldwin Locomotive Works and described elsewhere in this issue, includes the Detroit oil feed divider,



The Detroit Oil Feed Divider for Lubricator Lines

manufactured by the Detroit Lubricator Co., which either doubles or quadruples the number of feed lines from any individual lubricator. On each of these locomotives there are two Model A Detroit mechanical lubricators supplying valve oil to steam valves, cylinders and other points at which high-pressure steam is encountered. There are also four similar lubricators supplying engine oil to the friction points of the chassis, valve gear and hubs. Each of these lubricators has eight feed outlets, or 48 for the entire group. Twenty-three of these are run directly to the points lubricated. Fifteen are divided four ways by the oil feed divider. The remaining two, by the same means, are divided two ways. Thus, the six locomotive lubricators protect 86 points. Without the oil-feed divider at least 11 lubricators would be needed for the same service.

The action of the divider is automatic, no auxiliary power being needed. The divider is actuated by the pressure in the

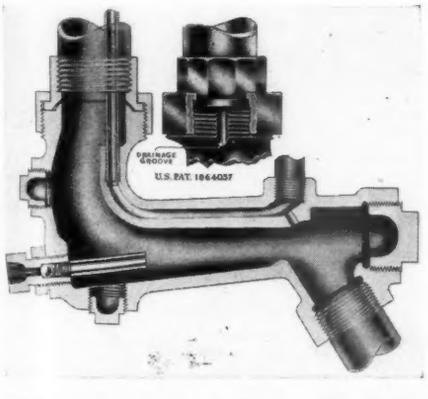
main-lubricator supply line. It divides the lubricant equally regardless of differences of hydraulic head in the several branch lines or at the delivery points. The four lines from the divider may be of different lengths, each may have a different frictional cooefficient, and each may have a different terminal resistance. Nevertheless, each line will deliver the same measured quantity of oil every consecutive cycle.

The divider has only three moving parts. Oil measurement is effected by pistons of the same diameter and stroke and operating under the same actuating pressure. A spring-load needle type check is supplied at the delivery point of the lubricant lines, especially at chassis points, to reduce resistance to a minimum in cold weather and at the same time provide a positive shut-off to prevent lines draining while the locomotive is standing.

Improved Parts For Sand Traps

The Graham-White Sander Corporation, Roanoke, Va., has recently developed the water-proof union for connecting the sander trap to the sand supply pipe, as shown in the illustration. It will be noted that the convex face of the joint is machined on the trap. The swivel carries the concave side of the joint. This turns all water to the outside of the trap even when the union is loose. To prevent water from damming up in the union ring and backing over into the joint, drainage grooves of ample size are carried through the threads on both sides of the trap body to conduct the water away.

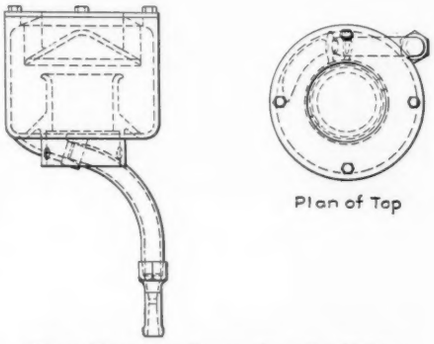
This company recently improved its sand-trap nozzle, which now has a ball-and-spring check to prevent sand from backing into the air restriction port. Also, instead of the restriction port in the nozzle being drilled directly through the body of the nozzle, as has been the custom, a separate jet has been provided that screws into the nozzle body. The restriction port is drilled through this jet and, in addition, a cross port is drilled through the hexed head of the jet. This means that the air inlet has three openings instead of one, which eliminates a great deal of the possibility of the restriction port becoming clogged. The cross port also provides a certain amount of air circulation that tends to keep the ports open. The use of the jet leaves a space in the nozzle body at the base of the jet for the accumulation of scale or dirt that would otherwise find its way into the restriction port.



Water-Proof Union and Clog-Proof Nozzle for Sand Traps

Steam Dryer for Auxiliary Dry Pipe

The Superheater Company, New York, has perfected a small steam dryer for the auxiliary dry pipe supplying steam to the locomotive auxiliaries. These dryers operate on the same centrifugal operating principle as the Elesco main steam dryer and have proved their efficiency in effecting a substantial reduction in the steam consumption of the auxiliaries.

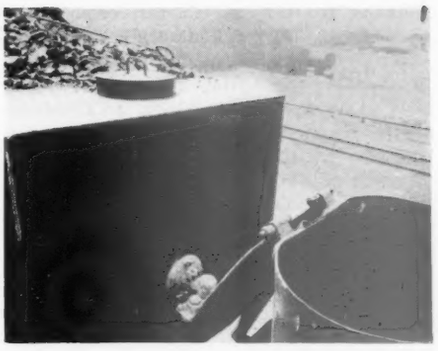


Steam Dryer for Locomotive Auxiliaries

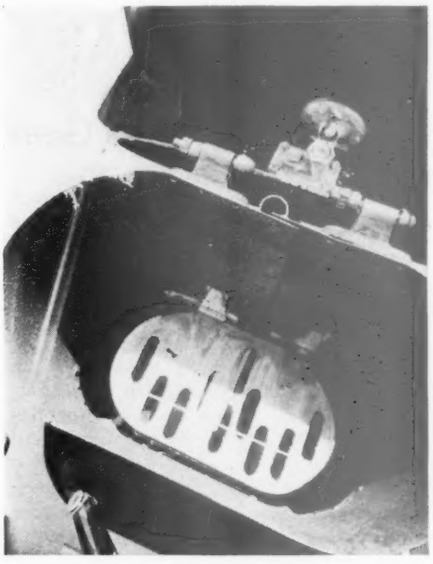
Tender-Tank Feeder For Water Treatment

The Dearborn Chemical Company, Chicago, has developed an automatic tender-tank feeder, as an addition to its line of automatic water-treatment proportioning equipment, to fill the need in places where the more elaborate Dearborn wayside treating plants are not practical or economical. This feeder provides a means of automatically introducing Dearborn feedwater treatment into the individual locomotive tender tank as water is taken, without imposing the responsibility for treatment handling on the engine crew. The feeder is mounted on top of the locomotive tank in the manner shown in the illustrations, and consists of the following parts: A reagent tank, a Dearborn treatment control valve, and a valve-actuating mechanism.

The device operates as follows: Every time a locomotive is turned at the terminal the reagent tank will be filled with treatment as the locomotive is serviced for coal, water, and sand. This is accomplished by means of a motor-driven rotary pump, which will deliver treatment from a chemical mixing tank into the reagent tank. It is important that the reagent tank be filled before water is taken. Then when water is taken from a water column or tank spout, the water passed through a screen placed in the manhole which sets up sufficient resistance, without splashing, to depress the arm of the valve-actuating mechanism in a downward direction. The other end of the actuating arm will move the lift rod of the control valve upward and unseat the valve. With the control valve open the treatment flows by gravity from the reagent tank through a floating orifice with a constant head and on through the control valve into the water in the tender tank. By reason of the turbulence produced in the tank by the incoming water, a thorough mixture of water and reagent is assured.



The Dearborn Reagent Tank Mounted on the Back of the Tender



The Manhole Screen Which Actuates the Flow of Treatment as the Tank Is Being Filled With Water

Lead-Bearing Free-Cutting Steel

A lead-bearing steel, which combines the qualities of openhearth steel with economy of easy machinability, was recently announced by the Inland Steel Company, Chicago. This steel, called Ledloy, is manufactured by a special process which distributes the alloying lead uniformly throughout the steel. The lead usually

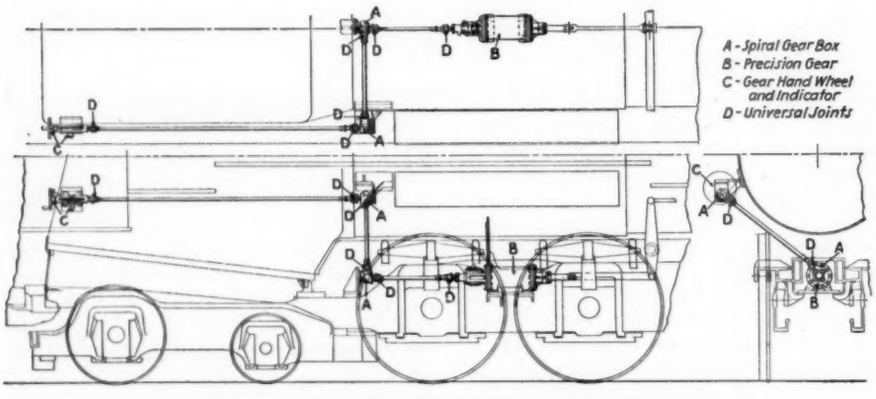
amounts to 0.15 to 0.3 per cent. The physical qualities of Ledloy are said to be exactly the same as steels of like analysis produced without the addition of lead. For example, Ledloy, with an analysis similar to S. A. E. 1120 steel, has, in the natural hot-rolled condition, a yield strength of 44,080 lb. per sq. in., an ultimate strength of 62,280 lb. per. sq. in., an elongation in 2 in. of 36.2 per cent, and a reduction of area of 63.7 per cent. Ledloy, oil-quenched and drawn at 1,000 deg. F. and with an analysis comparable with that of S. A. E. 1045 steel, has a yield strength of 64,750 lb. per sq. in., an ultimate strength of 97,900 lb. per sq. in., an elongation in 2 in. of 28.5 per cent, and a reduction of area of 52 per cent.

In the higher carbon and alloy analysis the use of Ledloy requires no changes in methods of heat treatment. No difficulties are encountered in welding this steel, and the strength and ductility of the welds are not affected by the presence of lead. Ledloy is made in all hot-rolled and cold-drawn forms. It is used in making all rolled shapes on which extensive machining operations are necessary.

Center Mounted Reverse Gear

In the drawing is shown an application of Precision power reverse gear on the longitudinal center of the locomotive between the frames, designed by the Franklin Railway Supply Company, Inc., New York. As shown, the gear is operated by three sections of reach rods through two spiral gear boxes; each section of rod has a pair of universal joints and is splined at one end. The splined shafts prevent boiler expansion and contraction from affecting locomotive valve events, thereby permitting the valves to be set when the locomotive is cold. Center mounting the gear between the frames eliminates torsional disturbance of the rocker shaft, inasmuch as it acts at the center of the shaft rather than at one end; this results in less variation in cut-off between the right- and left-hand valve gears, with a consequent even cylinder power for each side of the locomotive.

Other advantages offered by this center-mounted gear are: (1) The location between the frames on the center line of the locomotive facilitates application of the reverse gear, particularly on streamlined locomotives, (2) application to the locomotive frames is more secure and maintenance costs are lowered, (3) the overhanging bracket studded to the boiler shell and the difficulty with loose studs are eliminated, (4) clearance problems are minimized by location of the gear on the center line of the locomotive and (5) extra space under the running board for additional reservoir capacity is made available.

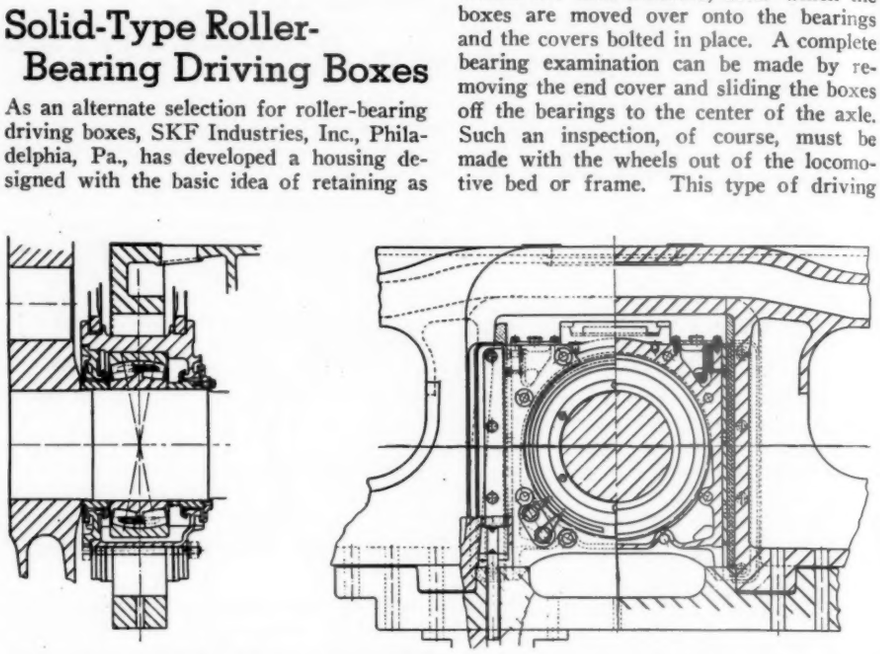


Center-Mounted Franklin Precision Power Reverse Gear

Solid-Type Roller-Bearing Driving Boxes

As an alternate selection for roller-bearing driving boxes, SKF Industries, Inc., Philadelphia, Pa., has developed a housing designed with the basic idea of retaining as many as possible of the successful features of the split-cellar type, but at the same time simplifying the journal box itself. The SKF spherical roller bearing is used, each bearing being housed in an individual box. The box is a one-piece housing similar in outward appearance to the former SKF design. Clearance in the oil enclosure permits the box sufficient movement to take advantage of the self-aligning feature of the spherical bearing. Radial loads are transmitted to the bearing through an accurately ground pad in the top of the box, while thrust loads are carried directly to the sides of the pedestal ways through substantial flanges. Provision is made so that no lateral thrust loads are transmitted to the wheel hub. The wheel side of the box is closed with a cast-steel cover held in place with bolts extending through the box. These bolts do not extend into the oil reservoir space, thereby eliminating any possibility of oil leakage around the bolt or nut heads.

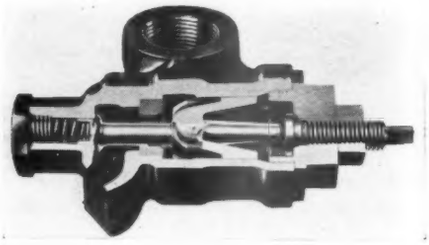
In assembling this type of application, boxes are placed on the axle first. Bearings, spacing collars, outside covers and wheels are then mounted, after which the boxes are moved over onto the bearings and the covers bolted in place. A complete bearing examination can be made by removing the end cover and sliding the boxes off the bearings to the center of the axle. Such an inspection, of course, must be made with the wheels out of the locomotive bed or frame. This type of driving box can be used with either parallel plates or shoe-and-wedge type liners, the selection of which depends upon the requirements of a particular job. Provision can be made for forced-feed or wick-feed lubrication of the pedestal ways.



Application of SKF Solid Driving Box With Shoe and Wedge—Parallel Plates Can Be Used With the Same Box Application

Steam-Operated Cylinder Cock

In order to relieve excessive pressure within the locomotive cylinder automatically, The Okadee Company, Chicago, has recently designed a cylinder cock that has a differential piston which is held in closed position by boiler pressure developed in the cylinder. It is a close-fitting cylinder cock, taking up very little room underneath the



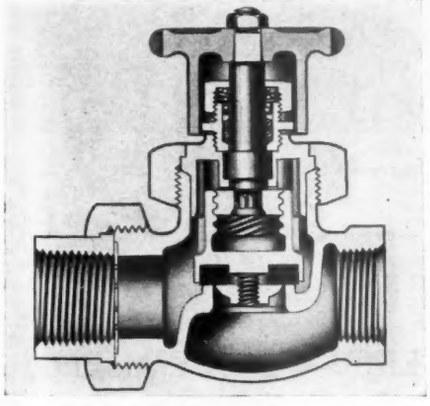
Okadee Steam-Operated Cylinder Cock

cylinder and has heat-treated stainless-steel pistons and seats. The piston spring which is made of stainless steel is located outside of the steam cavity where it is unaffected by superheated-steam temperatures. An emergency screw is provided in the cylinder-cock cap for closing the cylinder cock in the event of a broken steam pipe from the operating valve and is also used for closing the cylinder cock when conducting a hydrostatic test on the locomotive.

These cylinder cocks are operated from the cab by a valve with a handle having a Bakelite ball grip. When cylinder cocks are closed, steam from the boiler passes through the valve to the end of each cylinder-cock piston, holding the cocks in the closed position; when it is desired to open the cylinder cocks this pressure is exhausted through the valve. This prevents cylinder cocks creeping shut when they are open and prevents the accumulation of condensation in the operating lines as the valve is open to the exhaust.

Quick-Opening and Closing Air Valve

Crane Co., Chicago, has designed a brass globe valve for air installations where quick-opening quick-closing valves are needed. Among its features are an apron on the wheel to protect the upper part of the valve from rough handling and a brass screen in the union connection at the valve



Crane No. 237 Quick-Closing and Opening Valve for Air Lines

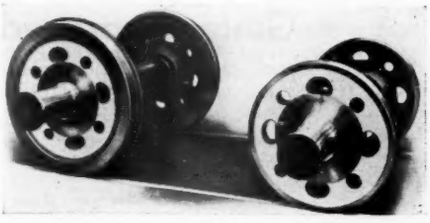
inlet to keep out foreign matter. It is made in ¾-in. and 1-in. sizes and is recommended for working pressures up to 150 lb. It is designed so that the composition disc can be quickly and easily renewed when necessary. A spring maintains a constant load on the stuffing-box packing.

The valve has a nonrising stem which opens or closes in about a three-quarter turn. The stem rotates but does not rise, being held from vertical movement by a shoulder which rests between the bonnet and stuffing box. Turning the wheel raises or lowers the disc holder, which is held from rotary movement by two vertical guides, one on either side of the holder.

This valve should always be installed with the pressure above the seat. An arrow on the body indicates the direction of flow. The protective apron extends down over the packing nut, stuffing box and the top end of the bonnet. Dismantling and reassembling of this valve is made easy by a union bonnet connection.

Boxpok Trailing-Wheel Centers

The General Steel Castings Corporation, Granite City, Ill., has developed a Boxpok design of trailing-wheel center similar in



Boxpok Trailing-Wheel Centers With and Without Tires

construction to the Boxpok driving-wheel center. In common with the latter, the Boxpok trailing-wheel center has box-section spokes and a box-section rim instead of the usual solid spokes and rim. The Boxpok construction provides a well-supported rim, giving greater lateral and radial strength and more uniform tire support without increase in weight.

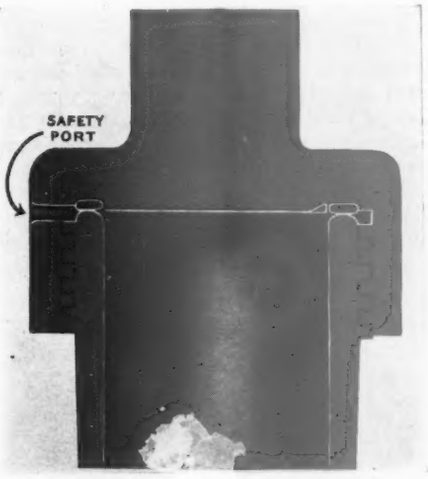
Duplex Thermic Firebox Syphons

In the drawing is shown Duplex Thermic Syphons, of which three recent installations have been made by the Locomotive Firebox Company, Chicago. The advantages of the duplex Syphon, as developed from the original Thermic Syphon, are noted in the longer necks providing greater flexibility in the extremely long fireboxes such as are used on Mallet and other high-powered and high-pressure boilers of today. It will also be noted that the upper necks of the two side syphons are attached to the side sheets, drawing on the lower front of the two side water legs for more complete circulation around these large fireboxes.

These syphons add materially to the firebox heating surface. The simplicity of arch design is maintained. The arch is carried on the lower syphon neck and uniform brick patterns are used the full length of the arch.

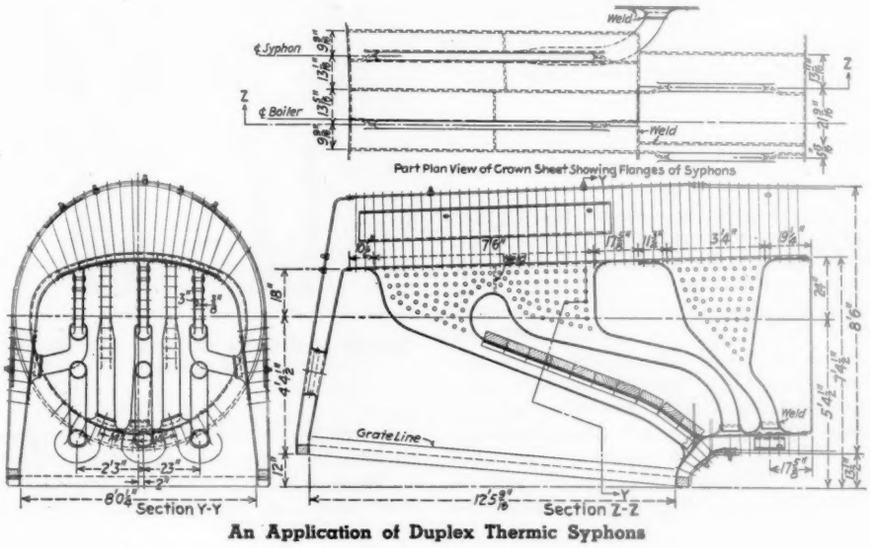
Safety Washout and Arch-Tube Plugs

The boiler washout and arch-tube plug shown in the illustration is made by Graham-White Sander Corporation, Roanoke, Va. A safety warning port is drilled



Graham-White Safety Boiler Washout Plugs

through the cap at the base of the threads. The moment the cap is loosened, if there is any pressure left on the boiler, this port will give immediate warning. If a leak



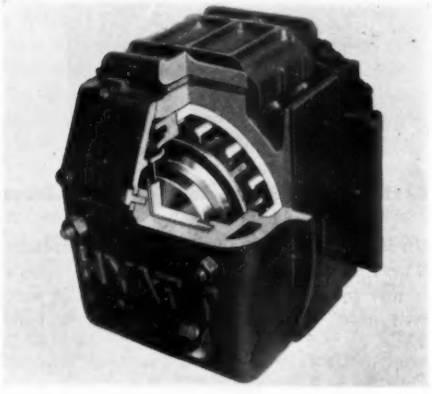
An Application of Duplex Thermic Syphons

occurs through this warning port it indicates that the cap is not properly seated, due either to scale or to not being properly tightened. This saves time by showing up any leaks in the seats of the plugs before the boiler is actually under pressure.

There are no threads inside of the bushing to become filled with scale or mud or injured by washing implements. The exterior square threads are designed to prevent cross threading. The radiused seat on the bushing presents no edges that may be upset or damaged by tools; also, it eliminates recesses which might fill with sediment and prevent seating. The seat in the cap is a copper asbestos gasket held securely in a groove. A screwdriver slot is provided for removing the gasket. All sizes of caps have 1½-in. square heads.

Hyatt Solid-Roller-Bearing Journal Boxes

The journal box with solid roller bearings which is shown in the illustration is the product of Hyatt Bearings Division of the General Motors Corporation, Harrison, N. J. The box is of steel with an integral outer end so designed that both vertical and lateral forces are absorbed within a single rigid casting; lateral clearances are controlled within the box. There is an inspection opening at the upper front position through which lateral clearance may be checked or axle blocks removed or adjusted without drawing the lubricant or in any way disturbing the other parts. The



Hyatt Journal Box with Solid Roller Bearings and One-Piece Bronze Cage

boxes are designed to retain the lubricant and exclude water and dirt from the box and bearing.

These solid-roller railroad bearings are made up of inner and outer race members with double-roller assemblies having solid rollers and one-piece bronze cages. Both races and rollers are made of heat-treated alloy steel. The bearings are of liberal proportions to provide high capacity and long life. They may be completely disassembled for cleaning and inspection. All component parts are individually replaceable without the use of tools. The inner races are shrunk on the journals and the outer races are pressed into the journal boxes. Roller assemblies are inserted into the boxes by hand.

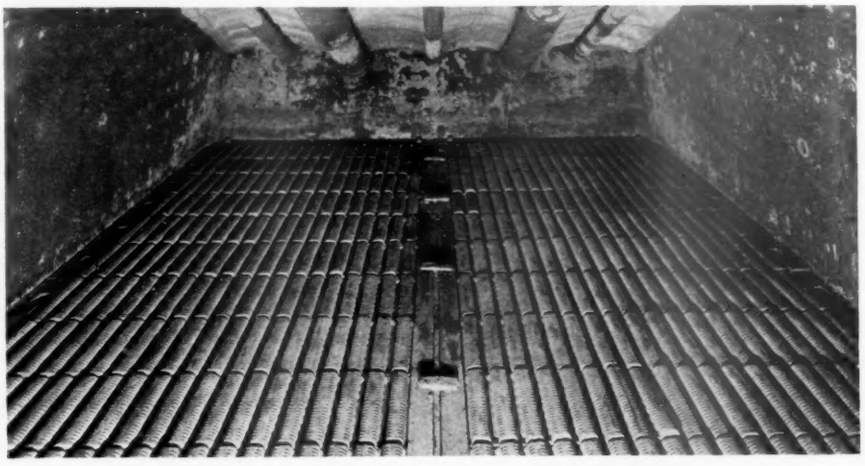
An important feature of Hyatt design is illustrated by the treatment of the axle itself. The axles are all designed with a view to keeping the stresses considerably below those in a plain-bearing axle and well within recognized safe values, and the inner races are so mounted as to eliminate stress concentration at the inner end of the race. This is accomplished by tapering the inner end of the race bore for the amount of the shrink-fit allowance. By so doing the pressure between race and axle fades out gradually and a sudden change of stress is avoided.

Hulson Tuyere-Type Grates Improved

The Unit finger casting for the Hulson tuyere-type grate, product of the Hulson Grate Company, Keokuk, Ia., has recently been redesigned and now has baffled air-admission openings and a flat, instead of a curved, top. The baffled air-admission openings, shown in one of the illustrations, was adopted to reduce ash-pan loss with all sizes of coal. The application shown in the other illustration has the carrier bars located on 10-in. centers. The Unit finger castings are 2½ in. wide, 9¾ in. long, and weigh 6¾ lb. each—an average of six units are required per square foot of grate area. The finger units fit closely on the carrier bar, permitting only a slight oscillation when the grate is shaken, the slight movement being sufficient to dislodge any accumulation of ash at the tuyere opening.

The tuyere openings are cast with dry-sand cores, and their size controls the total air inlet through the grate. The net air inlet developed can be from 11 per cent to 26 per cent of the total grate area; the sum of the tuyere openings will total in excess of 60 per cent of the total air opening through the grate. A ¼-in. opening is maintained at the ends of the units. The total net air inlet is based on the net gas area through tubes and flues, the ratio depending on the front-end design and class of service.

Tests conducted with these grates have shown an ashpan loss of ¾ lb. of fuel per sq. ft. of grate surface, when a locomotive is being fired up. It is reported that small sizes of anthracite and bituminous slack are burned with practically no ashpan loss.



Firebox Equipped With Hulson Improved Tuyere-Type Grates

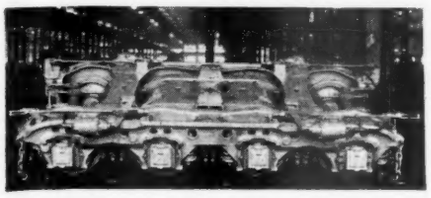
Hulson Unit Grate Castings With Baffled Air Admission

Eight-Wheel Equalized Commonwealth Trucks

The Commonwealth eight-wheel swing-motion equalized tender truck, which has been developed by the General Steel Castings Corporation, Granite City, Ill., has been successfully applied to the tenders of twelve 4-8-4 locomotives recently built by the Baldwin Locomotive Works for the Atlantic Coast Line. It is similar in design to the standard Commonwealth six-wheel swing-motion equalized tender truck, many thousands of which are in service. The purpose of increasing the number of wheels is to decrease the load per wheel when applied to high-capacity tenders. The Atlantic Coast Line tenders have a capacity of 24,000 gallons of water and 27 tons of coal.

The trucks are arranged for unit clasp brakes, four brake cylinders being mounted

on each truck frame. The brakes are divided into two systems, each system braking two pairs of wheels. The front system of spring rigging of each truck is cross-equalized which forms a three-point support and transfers the load from one



Completely Assembled Eight-Wheel Tender Truck for the Atlantic Coast Line

side of the truck to the other. The method of equalization consists of the Commonwealth standard arrangement of semi-elliptic springs and roller equalizers, both systems being dead-ended with the usual arrangement of coil springs.

Two-Bearing Outside Journal-Box Mounting

Where space limitations militate against the use of a large single bearing of sufficient capacity for a particular application, SKF Industries, Inc., Philadelphia, Pa.,

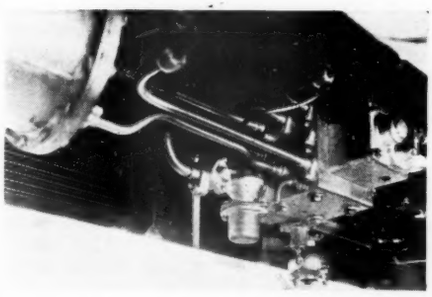
SKF Two-Bearing Box as Applied to Power Trucks of a Diesel-Electric Locomotive

has developed a two-bearing mounting. Two self-aligning bearings, the combined capacity of which is equal to one large bearing, are mounted on tapered sleeves and housed in a cast-steel box. An improved design of oil enclosure prevents the loss of oil and excludes dirt and foreign matter. The adapter sleeve type of mounting makes it possible to mount and dismount bearings without danger of loss of fit or damage to any parts.

This type of mounting is suitable for any outside journal application. It is particularly adaptable for Diesel-electric power trucks, steam-locomotive trailer trucks and other locations where the journal loads are high and the space limited.

Full-Flow Wrought Copper Fittings

Lightweight soldered copper fittings and copper tubing, made of 99.9 per cent pure copper by the American Radiator Company, New York, are now being used for air-brake equipment where vibration tends to loosen or break joints made with threaded fittings. Sample assemblies of Arco copper pipe and fittings were vibrated in a standard test machine at a frequency of 1,000 vibrations per minute, for a period of three and a half weeks, with a total vibration time of 544 hours. At the conclusion of this test the soldered joints proved to be tight.



Control Valve of An Air-Brake System with Copper Soldered Fittings and Copper Tubing

With the use of non-ferrous Arco copper pipe and fittings on air-brake equipment, no rust or scale can be formed in the piping lines, thus eliminating a source of trouble in the moving parts of compressors and other air-brake equipment. These copper fittings and pipe were selected for the air-brake lines, as well as other important piping, on high-speed streamlined trains manufactured by the Edw. G. Budd Manufacturing Company, such as the Santa Fe Chief, Rock Island Rockets and Reading Crusader.

Joint Compound for Oil and Water Lines

The Kenite Laboratory, 83 Murray Street, New York, has recently introduced in the railroad field two products known as Kenite Joint Compound, for use on steam, air and water lines in power plants and on locomotives and cars, and Kenite Oil Pipe Plastic for use wherever it is desired to stop oil leakage. Both of these products are plastic in character, an essential difference being that the joint compound remains plastic at all times, while the oil pipe plastic hardens in contact with the atmosphere while remaining in a semi-plastic state underneath the surface.

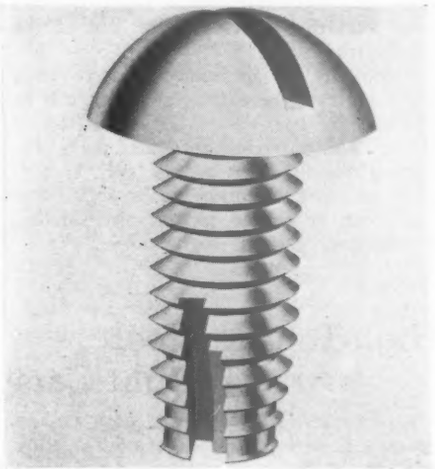
The joint compound is especially adapted to steam and air lines with threaded or flanged connections under pressure. On coach heating lines it has been used successfully on six-inch gaskets under 85 lb. pressure, and in power plants on steam lines and boiler studs under 500 lb. pressure. It is also used on air, water and steam lines and on boiler studs on steam locomotives and for yard and car air lines.

Used as a joint compound on threaded pipe connections it has peculiar qualities of elasticity which make wicking unnecessary by providing a joint-sealing material that does not set up hard, but remains flexible and adjusts itself to the contraction and expansion of the joint. It is said that its adhesive qualities prevent it from breaking loose from the pipe surfaces and passing through the pipe. This feature is of importance in locomotive piping, in order to prevent interference with the operation of such devices as triple valves, power reverse gears, etc.

The oil pipe plastic has been applied successfully in the railroad field as a sealing medium on joints which are required to be oil-tight, such as oil lines and cover plates on Diesel engines.

Thread-Cutting Screw For Plastic Materials

The Shakeproof Lock Washer Company, Chicago, recently announced the development of the illustrated Shakeproof "Hi-Hook" thread-cutting screw, expressly developed for plastic materials. This screw is designed with a double-width slot which gives an acute cutting edge that cuts a clean sharp thread in all types of plastic



Shakeproof "Hi-Hook" Thread-Cutting Screw for Plastic Materials

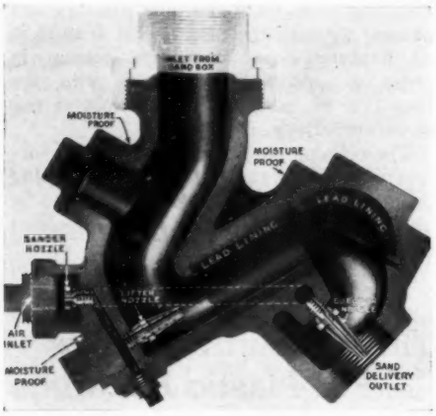
compositions, both molded and laminated. This construction materially reduces the high driving torque normally encountered and is said to enable fast, easy driving with a minimum of the breakage common to molded plastics.

Because the screw cuts a standard thread, it may be replaced if necessary by a conventional machine screw of the same size without damaging the tapped hole. The need for a separate tapping operation or threaded inserts is eliminated, the only requirement being that the screw be in-

serted in a molded or drilled hole of the proper size and driven home with a hand or power driver.

Improved Viloco Sander Traps

The Viloco Railway Equipment Company, Chicago, has developed a sander, Type FL-317, which contains all of the features of its former designs except that this sander is made in individual units and is so arranged that any group of sanders can be confined to very small space on the side of the boiler. Connection is made to the sand box by means of nipples. The body and screw cap of the new sander are lead lined, and the lining can be replaced when worn out, thus extending the life of the sander traps.



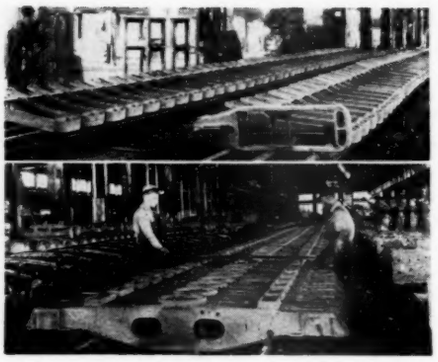
Improved Design of Viloco Sander

Since only one air connection is required for each trap, the entire equipment can be operated by one Viloco duplex engineer's valve. This valve has graduated ports permitting the engineer to use only enough sand required to prevent slipping. The valve can be ported to suit any sanding arrangement desired.

High-Tensile Steel For Freight Cars

The illustrations show truck bolsters and yokes of high-tensile lightweight alloy steel in the finishing process at the plant of the Buckeye Steel Castings Company, Columbus, Ohio. The physical properties of this material based on an average of tests, are as follows: Ultimate tensile strength, 95,100 lb. per sq. in.; yield point, 63,840 lb. per sq. in.; elongation in 2 in., 26.6 per cent, and reduction of area, 57.9 per cent. In static test results the actual breaking load of the 50-ton bolster was 509,200 lb., or 20 per cent above the A. A. R. minimum, and the actual breaking load of the yoke was 655,300 lb., or 19 per cent above the A. A. R. minimum allowable load.

Standard approved designs of couplers and side frames are now also available, and weight comparisons of high tensile designs versus grade B steel are definitely established.



Truck Bolsters and Yokes of High-Tensile Steel Being Finished at the Buckeye Works

For cars of 5½ in. by 10 in. axle capacity, the weight saving by using high-tensile steel for couplers, yokes, and bolsters, amounts to 670 lb. per car set. It has been estimated that the weight saving of 670 lb. per car by using high-tensile couplers, yokes, and bolsters would justify an increased cost of $42.10 and $84.40 per car, respectively; as a matter of fact, the increased costs of these parts as compared with grade B steel, are, 8 per cent and 50 per cent, respectively, below these figures.

Ball-Joint Lid For Journal-Boxes

The Symington-Gould Corporation, Rochester, N. Y., is offering a full-bearing articulated journal-box lid in which a separate housing member, rotated by the pressure of the spring shoe or lever against the hinge lug, applies full closing pressure to the center of the lid proper through a ball-and-socket connection of ample area. The latter allows the lid to adjust itself freely to the box face regardless of angular or other variations in the relative positions of lug and face. This lid also has a grooved joint which adapts itself to small surface irregularities of the box and lid faces, and is secured to the box by a headless pin.

Symington-Gould Ball-Joint Lid Partially Dissembled

The lid is shipped with its spring held under partial compression by means of a large wire nail passed through holes in the sides of the housing and through the spring lever. The lid is assembled to the box by resting it on the top of the hinge lug at the proper angle, inserting the headless pin, rotating the lid towards the closed position, and removing the wire nail as soon as the further compression of the spring by the high point of the lug relieves the pressure on the nail. The lid can be removed by reversing the sequence of operations.

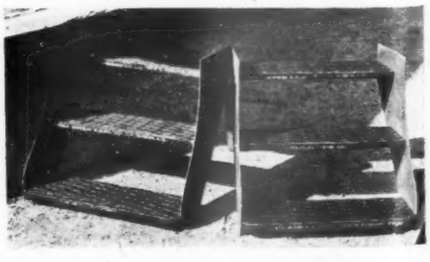
Bakelite Acetate Molding Materials

After several years of extensive research, Bakelite Corporation, New York, N. Y., announces the development of a line of high-quality acetate molding materials. Bakelite acetates are thermoplastic molding compounds with a cellulose acetate base and are recommended for both injection and compression molding. They are manufactured in granular form in a wide range of colors, including crystal clear, black and variegated mottles. They are also available in transparent, translucent and opaque colors.

Bakelite acetates are custom-made materials and, therefore, molding properties and finished material properties can be altered to suit specific applications. Molded pieces produced from Bakelite acetates have a lustrous finish. These molded parts have unusual strength properties, being especially resistant to impact. Bakelite acetate materials are suitable for an infinite variety of uses, restricted only by the effect of heat and certain solvents.

Wrought-Iron Sheets For Car Steps

The sides of passenger-car steps for the Norfolk Southern are now being made of wrought iron furnished by the A. M. Byers Company, Pittsburgh, Pa. Wrought iron is used now, because this railroad found that under ordinary operating conditions the accumulation of cinders and snow became moistened sufficiently to cause rapid corrosion of the material formerly used for this purpose.



Passenger-Car Steps with Sides of Wrought Iron

Six of 240 Bulk-Cement Containers Built by A. C. F. for the L. C. L. Corporation

Cement Containers Unloaded by Air

The American Car and Foundry Company, New York, recently delivered to the L. C. L. Corporation 240 cylindrical containers designed for the transportation and handling of cement and other bulk commodities, which are capable of being unloaded by air under pressure. The container bodies are of all-welded construction and formed with a cylindrical shell, a convex head, and an internal conical hopper. The shell sheets are joined by vertical butt welding. The heads are butt welded to the shell sheets. The segments of the hopper cone are butt welded and formed with a flange, the larger outside diameter of which corresponds with and is welded to the inside diameter of the shell.

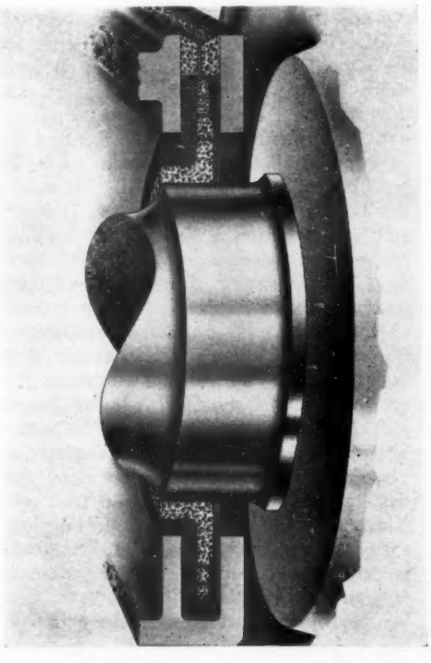
The head of the body is arranged with a steel ring located on the center line of the container. A supplemental ring arranged with a gasketed top cover is bolted to this ring. The opening in this supplemental ring is of a size sufficient for a man to enter the container. A safety valve is located in the head to relieve pressures in excess of 50 lb. The small diameter opening at the bottom of the hopper is arranged with a steel ring to which a casting forming the connection for the discharge hose is bolted. An opening with a door is provided at the bottom of the shell for access to the valves controlling the activating air jets and piping. This door is arranged with a large hole for the attachment of the discharge hose, a slot for the air-control handle, and an additional hole at the bottom for the air-inlet connection.

The dimensions, capacity, and weight of the containers are as follows: Outside diameter, 7 ft. 6 in.; height of cylindrical portion of shell, 7 ft. 3¾ in.; extreme height over inlet cover, 9 ft. 2¼ in.; capacity, 20,000 lb.; and average lightweight, 4,385 lb.

A special gondola is used for the transportation of these containers. The gondola used at present accommodates six containers. Each side of the gondola is arranged with five square holes of a size sufficient to apply the air hose and the discharge hose to the containers. The sides are further provided with guides secured to the top chord. These guides prevent side shifting of the containers in transit. The floor of the gondola is fitted with angle guides which engage the angle clips on the bottom of the container. These guides definitely position the location of the door in the container with respect to the openings in the side of the gondola. A record unloading time for six containers that is, 60 tons of cement, is 1 hr. and 20 min.

Cushion-Fit Triple-Seal Dust Guard

After several years of successful performance under a wide range of operating conditions, the illustrated "Cushion-fit" dust guard has been placed on the market by National Bearing Metals Corporation, St. Louis, Mo. This dust guard, which is manufactured for all sizes of standard A. A. R. journal boxes, is of one-piece construction and is composed of three fundamental parts; (1) a seal plate, (2) a resilient, elastic, flexible and compressible sealing member, and (3) a retainer plate. The seal and retainer plates are hard fiber, finished with Glyptal enamel, to render them oilproof. The resilient sealing member is specially treated cellulose sponge, sandwiched between the seal plate and retainer plate, and is secured to the seal plate by staples. The retainer plate is attached to the assembly by cotton webbing strips, stapled across the top and at the center of the bottom, beween the seal and retainer plates. A strip of treated cellulose sponge 1 in. thick and 1½ in. wide, of proper length, is affixed with staples to the cotton webbing across the top of the guard, which forms an effective seal for the top of the dust-guard well.



Triple-Sealing Protection is Offered by the Cushion-Fit Dust Guard

The guard has a free thickness of 1⅛ in., which, when installed in the box, compresses to fit the nominal ¾-in. box well. The seal plate is sufficiently pliable to seal against the back wall by the pressure necessary to compress the guard to ¾ in. The portion of the sealing member extending inside the axle opening of the seal plate is expanded to form an elastic snug-fitting flange on the axle dust-guard seat. The axle opening in the ¼-in. retainer plate is counterbored on the sealing member side to form a radius that will not tend to shear or cut the cellulose sponge sealing member. The ⅛-in. seal plate has an opening for the axle 1/32 in. larger in diameter than the axle dust-guard seat. This close fit insures that the entire seal assembly will move in the box well, following any axle movement in reference to the journal box; this prevents excessive flexure or damage of the sealing member flange. The Cushion-fit dust guard provides triple sealing protection at the three vital points of the journal box, because it hugs the axle, expands against the walls of the guard well and seals the top of the well. This dust guard is easily applied without tools. It performs satisfactorily under all climatic conditions and is not affected by oil, moisture, dust, ice or extreme ambient temperatures.

The Cushion-Fit Dust Guard

The oldest installation of Cushion-fit dust guards has made over 210,000 car miles in high-speed passenger service. A recent inspection showed that these dust guards are still effectively protecting bearings, journals and packing against contamination by dust, water and grime.

Center-Bearing Journal-Box Lid

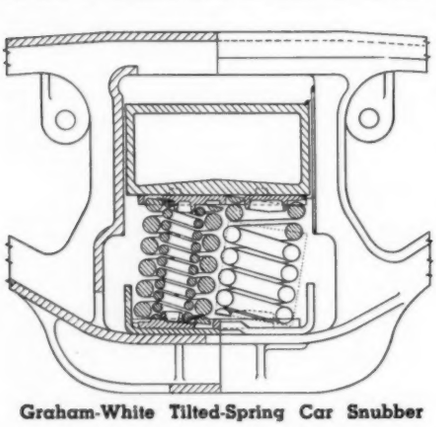
In the illustration is shown a center-bearing journal-box lid made to meet all A. A. R. standard requirements, which operates on the standard A. A. R. hinge lug. The coiled spring, acting through the spring lever, forces the hood against the center of the cover member, thus pressing the lid

against the face of the box with a uniform pressure all around the edge of the lid. The coiled spring has a great degree of flexibility, thus ensuring ample lid pressure even with badly worn hinge lugs. It is designated as the National "Flexo" lid and is manufactured by the National Malleable and Steel Castings Company, Cleveland, Ohio.

The National "Flexo" Center-Bearing Journal-Box Lid

Tilted-Spring Snubber For Freight Cars

The illustrated tilted-spring car snubber for freight cars and tenders was recently developed by the Graham-White Sander Corporation, Roanoke, Va. From the drawing it will be seen that the snubbing or damping action is obtained by holding the bolster in contact with the side-frame column. This is accomplished by using a spring cap which tilts the spring group at a suitable angle. The springs at opposite ends of the bolster are tilted in opposite directions. This prevents the hammering of the bolster between the side-frame columns.



Graham-White Tilted-Spring Car Snubber

The snubber is designed so that the loads on the springs are true axial loads and not on diagonal corners as might appear at first glance. This is accomplished by readjusting the spring seat which makes the spring, at all angles of tilting, rest on a theoretical knife edge and never diagonally on the corners of the spring. This tilting of the springs is accomplished and controlled by means of cast-steel spring caps, with their radiused spring seats, which are substituted for, and are interchangeable with, the conventional spring caps. These spring caps are held in position by nubs on the back of the caps which fit into the holes provided for similar nubs on the conventional caps. This arrangement is said to permit universal bolster movement precisely as does the conventional spring arrangement, and also allows the same easy spring inspection as before the snubber installation.

Modified Design of Journal Bearing

During the past two and one-half years the research department of the National Bearing Metals Corporation, St. Louis, Mo., has made a study of railroad-journal-bearing problems dealing with the design, performance and results obtained from A. A. R. bearings, roller bearings, and National Disc-Flo units. It was concluded from this study that, by modification and proper lateral control, plain-type journal bearings will operate successfully in standard A. A. R. boxes and eliminate many of the present failures of A. A. R. bearings. The study revealed that, although the A. A. R. bearing was designed so that the lateral thrust should be imposed entirely on the journal fillets, it cannot function in this manner, since established A. A. R. nominal and condemning limit dimensions of bearings, wedges, boxes and journals inherently prevent this intended location of thrust loading due to lateral interference between the axle collar and the end of the bearing adjacent thereto.

With present A. A. R. standards and condemning limit dimensions now in force, there exists a minimum of 5/8 in. axle lateral when these parts are new, and, with the maximum allowable accumulation of wear on all thrust component parts, this axle lateral increases to 2 in. Shortening the bearing by removing stock from the end adjacent to the axle collar has been resorted to, unsuccessfully, as a remedy for this interference. Furthermore, thrust wear on the end of the bearing adjacent to the axle collar is rapid because fluid film lubrication cannot be maintained between two strictly parallel surfaces. The rapid wear on this end of the bearing quickly exposes the lining bond in a plane at right angles to the thrust surface, developing high frictional heat and partially destroying the lining bond at this point. The oil pressure developed by impacted thrust loads, or such fluid film pressure as is generated in normal running thrust, enters and cleaves the lining from the bearing back, progressing until the entire lining is loose. An examination of the return of scrap bearings made at the laboratory of the National Bearing Metals Corporation, indicates that the majority of A. A. R. journal bearings are not removed from service because of radial load wear, but indirectly from the effects of excessive lateral imposed by improper thrust loading.

As a result of this study the National Bearing Metals Corporation developed formulas for computing axle lateral movement, with the aid of which they have developed a proposed modification of bearing design and proper lateral control of plain-type journal bearings, all of which has been accomplished without any change in present box design or lubrication methods. The proposed modified design of the bearing controls lateral movement so that all thrust loads are taken by the fillets rather than by the ends of the bearings against the axle collar.

Steam-Ejector System Improved

During the past year several improvements have been made in the Carrier-Safety steam-ejector air-conditioning equipment for railway passenger cars, particularly to the underframe type of refrigerating unit. These facilitate servicing, make the unit more compact and reduce makeup water requirements.

The principal change is in the arrangement of the pumps, sump and piping which are applied to the rear of the unit. The sump which was formerly a separate part has been eliminated and is replaced by one formed in the bottom of the casing under the condenser. This new design results in better separation of the dirt from the condenser water and furnishes convenient flushing openings for cleaning.

The pumps are now carried on brackets applied to the rear of the unit casing instead of to a framework which was attached to this casing. The piping, pumps and the purge ejector have been rearranged to be much more accessible for servicing. These modifications have reduced the overall width of the unit several inches.

A water recovery system, which reclaims the condensed steam removed from the trainline and adds it to the water used to cool the condenser, is now built into the unit, decreasing the amount of makeup water to be supplied. This water recovery system is a finned radiating coil, located in the casing under the condenser.

The redesign and the use of the lighter materials available have resulted in material weight reductions.

HEADLIGHT GENERATORS.—A four-page bulletin No. 166-B has recently been issued by the Pyle-National Company, Chicago, covering the latest steam turbo-generators manufactured by this company. The bulletin gives descriptive data, capacities and dimensions of 11 individual turbo-generator sets, also a concise statement of the construction and advantages of this type of compact efficient unit designed for industrial lighting and power use as well as for railroad service.

NEWS

1.5-Cent Rates in Effect in Calif.

Santa Fe co-ordinated service in effect, with competitors meeting reduced fares

A 1.5 cent rail rate and co-ordinated rail-bus service were placed in effect in the San Joaquin valley, Cal., on July 1. The Atchison, Topeka & Santa Fe placed co-ordinated rail and bus service at the rate of 1½ cents a mile in effect between points in the San Francisco Bay district and San Diego, by way of San Joaquin valley points in Los Angeles, while the Southern Pacific established the same basis of fares in the territory bounded on the north by San Francisco, Martinez and Stockton, and on the south by Redlands, Corono and San Bernardino, including all intermediate points on the San Joaquin valley line, the Pacific Greyhound on lines which would be competitive with the Santa Fe, and the Western Pacific on its Stockton route.

The establishment of the new service follows the action of the supreme court of California which on June 27 denied the Southern Pacific and the Pacific Greyhound petitions for a writ of review of the recent California Railroad Commission decision granting the Santa Fe intrastate bus rights. The court, in its decision, said that public convenience and necessity require the operation by the Santa Fe Transportation Company in conjunction with the Atchison, Topeka & Santa Fe, of a co-ordinated and integrated rail and freight service for the transportation of passengers and their baggage in intrastate commerce in California, and that Greyhound cannot render and Greyhound will not render all or any part of the service proposed by Santa Fe Transportation Company. The court also contended the commission had acted within its power.

The establishment of this service by the Santa Fe has been held up for some time. On October 8, 1935, the Santa Fe filed an application with the California Railroad Commission asking for permission to establish a co-ordinated rail service. Hearings on the application opened in Los Angeles on May 3, 1936, and were concluded in San Francisco on June 25, 1937. The case was finally submitted to the commission on December 31, 1937, and on April 18, 1938, the commission granted the Santa Fe the right to operate a co-ordinated and integrated rail-bus service with one rate, interchangeable rail-coach and bus tickets, optional routing by rail or bus or in combination to common points, stopover privileges, joint use of facilities, and a basic rate of 1½ cents per mile. On June 1, the Southern Pacific and the Pacific Greyhound petitioned the State Supreme Court for a writ of review and a temporary stay or injunction. On June 11 the Railroad Commission and the Santa Fe filed answers and the case was submitted to the supreme court on June 16.

"Agreed Charges" Win in Dominion

The Transport bill, sponsored by the Canadian government in Parliament at Ottawa has been approved by the Senate, with amendments. The measure had already been passed by the House of Commons. Passage came after opponents of the measure tried unsuccessfully to give it the "six months' hoist" (polite language for laying a measure aside until the next year's Parliamentary session).

The important provisions of the bill as passed by the Senate are those which authorize the railroads to establish "agreed charges" by contract with shippers in lieu of regular tariff rates; and the change of name of the Dominion Railway Board to that of Board of Transport. The bill also extends some regulation to water carriers, but the Senate amended the measure to exempt vessels plying between the Atlantic and Pacific coasts via the Panama Canal.

Central Greyhound Routes

Joint Board No. 71, composed of M. C. Cleveland of New York, has recommended in a proposed report that the Interstate Commerce Commission grant common-carrier bus certificates to the Central Greyhound Lines, affiliate of the New York Central, for extensions of operations between Dansville, N. Y., and the junction of New York Highways Nos. 2 and 70, and between Lisle, N. Y., and Ithaca. The former is designed to improve the present New York-Buffalo service, being approximately 12.8 miles shorter than the present alternate route, via Hornell, N. Y. Similarly, the Lisle-Ithaca route on which the applicant already has intrastate rights would improve the New York-Rochester service, being through less congested territory and 34.1 miles shorter than the present alternative.

I. C. C. Hearing on Express Rates

R. E. A. executives testify in support of increases and other adjustments

Direct testimony in support of the Railway Express Agency's application for rate adjustments designed to produce an additional $10,000,000 in revenue on the basis of 1937 traffic was completed at July 6's opening session of hearings in connection with the Interstate Commerce Commission's Ex Parte 126 investigation of the proposal. The hearing was held at Washington, D. C., before the commission's Division 7 (Commissioners Aitchison, Porter and Caskie), which was created to handle the railroads' Ex Parte 123 rate-increase application and which has since handled also the Pullman Company's Ex Parte 125 application.

The Express Agency offered the testimony of three witnesses—President L. O. Head and Vice-Presidents Charles A. Lutz and C. A. Frey—in support of the application, which was also filed on behalf of the Southeastern Express Company (about to be absorbed oy R. E. A.). Mr. Head testified briefly to tell how competition has in recent years "seriously affected" express revenues. Competitors, he explained, include motor trucks and freight-forwarding agencies. R. E. A., Mr. Head went on, has surveyed all operating-economy possibilities and is convinced that if it is to continue giving the express service to which the public is entitled, it must have both the proposed rate adjustment and the 15 per cent reduction in the wages of its employees, which it is now seeking along with the railroads.

One of the Express Agency's greatest difficulties, according to Mr. Head, has been to hold its own in the set-up where its competitors take the cream of the business, while R. E. A. undertakes to serve all points and handle all classes of traffic. It has tried cutting specific rates, but has concluded that the proposed general adjustment is the proper answer. As Mr. Head put it, the application simply asks for a "moderate" increase in the 100-lb. rates along with adjustments to "modernize" the rate structure as a whole. Commissioner Aitchison pointed out that the increased expenses listed in R. E. A. exhibits equaled the additional revenue expected; and he went on to ask wherein the proposal contemplated increased pay-

(*Continued on page 91*)

Advisory Boards Loading Forecast

See third-quarter total 19.6 per cent under 1937—Farm products up

Freight car loadings in the third quarter of 1938 are expected to be about 19.6 per cent below actual loadings in the same quarter in 1937, according to estimates compiled by the 13 Shippers' Advisory Boards and made public on July 5. On the basis of these estimates, freight car loadings of the 29 principal commodities will be 5,155,115 cars in the third quarter of 1938, compared with 6,413,014 actual car loadings for the same classes of commodities in the corresponding period last year.

Of the thirteen Shippers' Advisory Boards, all estimate a decrease in car loadings for the third quarter of 1938 compared with the same period in the preceding year, except the Central Western Board which estimates an increase of 5.2 per cent.

The tabulation below shows the total loading for each district for the third quarter of 1937, the estimated loadings for the third quarter of 1938, and the percentage of decrease or increase:

Shippers' Advisory Boards	Actual Loadings Third Quarter 1937	Estimated Loadings Third Quarter 1938	Per cent Decrease
Allegheny	872,709	573,788	34.3
Pacific Coast	253,656	228,588	9.9
Pacific Northwest	234,834	186,578	20.5
Southwest	422,441	395,521	6.4
Southeast	595,589	535,906	10.2
Great Lakes	455,717	333,292	26.9
Atlantic States	576,915	486,534	15.7
Central Western	223,866	235,488	5.2*
New England	101,381	89,031	12.2
Northwest	683,118	456,947	33.1
Mid-West	846,800	683,769	19.3
Ohio Valley	739,711	562,505	24.0
Trans-Missouri-Kansas	405,277	387,168	4.5
TOTAL	6,413,014	5,155,115	19.6†

* Increase.
† Decrease.

Of the 29 commodities included in the estimate, increases are expected in six, all of which come under agricultural products. Of the remaining 23 commodities, decreases are estimated for all. The six commodities for which increases are estimated are: All grain; flour, meal and other mill products; citrus fruits; other fresh fruits; live stock, and poultry and dairy products.

Loading of grain is expected to be 15.2 per cent greater in the third quarter of 1938 than in the same period last year, while for citrus fruit, an increase of 60.8 per cent is estimated. An increase of 4.8 per cent is expected for live stock; for flour, meal and other mill products, an increase of 1.9 per cent is expected, fresh fruits other than citrus fruits, 1.8 per cent increase, and poultry and dairy products, four-tenths of one per cent increase.

Of the commodities for which decreases are estimated those showing the largest percentage of decrease are: Automobiles, trucks and parts, 67.7 per cent; iron and steel, 41 per cent; ore and concentrates, 40.2 per cent; machinery and boilers, 34 per cent; agricultural implements and vehicles other than automobiles, 32.1 per cent; brick and clay products, 25.1 per cent; cotton, 24.3 per cent; coal and coke, 21.4 per cent; gravel, sand and stone, 21.3 per cent; lumber and forest products, 20.2 per cent; paper, paper board and prepared roofing, 13.8 per cent; sugar, syrup and molasses, 13 per cent; chemicals and explosives, 12.6 per cent; lime and plaster, 12.4 per cent; and petroleum and petroleum products, 8.4 per cent.

President Signs Motor Carrier Act Amendments

President Roosevelt has signed the bill carrying Motor Carrier Act Amendments recommended by the Interstate Commerce Commission. The amendments were reviewed in the *Railway Age* for June 25, page 1059.

B. & O. Exhibits Old Rolling Stock, —Well Not Quite

The Baltimore & Ohio is exhibiting a 2,163-year old Egyptian ox cart in the New York Museum of Science and Industry, Rockefeller Center, New York City. Used for transporting sacred animals to the sacrifice, the vehicle was found in the vault of an old temple. Since the walls of the vault were sealed almost hermetically, the wood is still hard and firm. Clay tablets scattered on the floor of the vault establish the date of the period of the cart as 225 B. C.

Jones on Make-Work Rail Loans

Chairman Jesse H. Jones of the Reconstruction Finance Corporation at his July 6 press conference told reporters that the RFC was looking around in the hope that it might find some railroad which was willing to borrow some money for maintenance and the reemployment of furloughed men. To date, according to Mr. Jones, the RFC had been unsuccessful. He also indicated that loans of this type would have to be made on a more liberal basis with a lower rate of interest and longer maturities and less onerous collateral requirements.

New Aeronautics Bill Is Passed

Congress last week passed the Lea-McCarran Civil Air Authority Act which provides for the creation of a Civil Aeronautics Authority to regulate aviation. The bill, as passed, was designed to set up an authority such that should the time come when the country was desirous of having a central transportation authority to control all transportation, the transition of this agency could be easily facilitated.

The measure provides for the creation of a Civil Aeronautics Authority of five members to be appointed by the President for six-year staggered terms, the original five appointees to serve from two to six years respectively at salaries of $12,000 annually. The law also directs the President to appoint an Administrator, who shall serve in the Authority, at a salary of $12,000 a year. The Authority is given broad powers to control all phases of the industry such as safety, rates, competition et cetera.

"Jim Crow" Case Is Heard by I.C.C.

Negro Congressman contends Rock Island should give equal accommodations

Oral argument was heard by the Interstate Commerce Commission on July 6 in the case of Negro Congressman Mitchell of Illinois versus the Chicago, Rock Island & Pacific, the case which arose when Congressman Mitchell was forced to ride in a "Jim Crow" car in the state of Arkansas despite the fact that he held a first class ticket from Chicago, Ill., to Hot Springs, Ark. Congressman Mitchell appeared before the commission and made a brief statement in which he pointed out the facts of the case and objected to the examiner's proposed report which would have the commission dismiss the case. His principal contention was that in view of the fact that he held a first class ticket, he should have received accommodations equal to those accorded any white passenger who was riding in the Pullman car.

W. T. Hughes, general attorney for the Rock Island, began his argument by telling the commission that this case was just an isolated one and was not typical of the service offered by the road. At this point Commissioner Mahaffie wanted to know whether or not this was a common occurrence on the Rock Island. Mr. Hughes said that it was not, but hastened to admit that it might easily happen again. Chairman Splawn then suggested that the road arrange for a reservation of Pullman space for negroes, to which Mr. Hughes rejoined that this would be a "wasteful" practice as very little of it would ever be used.

Answering Congressman Mitchell's contention that the railroad had ample unused Pullman space which it refused to sell to him, Mr. Hughes pointed out that had there been a compartment available in the car, the conductor would have permitted him to occupy it, thus meeting the requirements of the Arkansas segregation statute. Commissioner Eastman wanted to know whether the Congressman would have had to pay the regular Pullman seat rate or the added charge for a compartment. The attorney said that he understood that the Pullman company had made provisions for just such a contingency by permitting the passenger to ride in a compartment at the regular seat rate if no seats were available.

Mr. Hughes argued that the case does not involve the subject of discrimination and he went on to say that the complainant should have used some diligence and arranged for a reservation before the train left Memphis. Mr. Mitchell had previously told the commission that he had to change cars at Memphis and had offered to pay the Pullman charge for his seat just after the train left that city and entered Arkansas.

The railroad attorney also pointed out that the "Jim Crow" car now used on this

(*Continued on page 90*)

B. of R. T. To Have Own Wage Parley

Whitney out of step with other labor leaders, to have own confab on July 18

The Brotherhood of Railroad Trainmen and the Carriers' Joint Conference Committee will meet at Chicago on July 18 to start negotiations over the proposal to reduce wages 15 per cent. Agreement as to the date was reached at Chicago on June 30 at a preliminary meeting of 106 of the brotherhood's local chairmen and members of the carriers' committee. The trainmen have elected to act independently of the 20 brotherhoods composing the Railway Labor Executive's Association, which has agreed to begin negotiations at Chicago on July 20. It is expected that the presentation of evidence by the trainmen and the carriers' committee will be completed in two days, but that a decision or break will not occur until some time later.

During the preliminary meeting with the trainmen on June 30, H. A. Enochs, chairman of the Carriers' Joint Conference Committee, told representatives of the trainmen that "while railway net earnings fell from $65,000,000 in the first quarter of 1932 to $19,000,000 in the same period of 1938, the monthly earnings of regularly employed railway brakemen and flagmen increased from $146.75 in March, 1932, to $170.01 in March, 1938. In other words, a drop of more than 70 per cent in railroad net earnings was accompanied by an increase of 16 per cent in the average monthly earnings of railroad trainmen.

"Because of the serious financial condition of the railroad industry, a wage reduction of 10 per cent was voluntarily accepted by railway employees, effective February 1, 1932. On April 1, 1935, this wage deduction was completely eliminated and the peak wage scales of 1929 were restored. These wages were still further increased last year. In consequence, while the present railroad situation is far more desperate than that of 1932, wages are now far above the 1932 level.

"Regularly employed passenger brakemen or flagmen, on the average, earned $156.04 in March, 1932. The corresponding average was $188.09 in March, 1938. Regularly employed freight brakemen or flagmen earned $147.72 in March, 1932. The corresponding average was $171.81 in March, 1938. Regularly employed yard brakemen or helpers, on the average, earned $143.29 in March, 1932. The corresponding average was $163.28 in March, 1938. Under existing conditions the present high level of railway wages cannot be maintained."

A. F. Whitney, president of the Brotherhood of Railway Trainmen, told the carriers' committee that "regardless of economic conditions, I desire to make plain to you gentlemen that the effort or attempt on your part to bring about a cut in wages and a lessening of the buying power of your employees is an attempt to defeat the efforts of President Roosevelt and of every person interested in the economic recovery to save this nation, and it will be resisted by every power at our command. The railroad employees of this country are not overpaid—they are underpaid. The railroad workers of this nation, and particularly the members of the Brotherhood of Railroad Trainmen, for whom I speak, cannot and will not acquiesce in this attempt on your part to cut their basic wage and place them at the mercy of Wall Street bankers who hope to profit by this move.

"You cannot expect the loyal co-operation of railroad workers if they are constantly compelled to fight a reduction of their pay. Nothing has occurred since last October which justifies the attempt that is now being made to give the men and women who work on your railroads a cut in pay and force upon them lower standards of living than they now have. If the settlement of the wage controversy last October was as Mr. Enochs said at that time, 'In the interest of the public', then it is in the interest of the public today."

5 Months N. O. I. Was $45,288,504

0.54 per cent return compares with 1937's $240,111,987 or 2.85 per cent

Class I railroads, as noted briefly in last week's issue, had a net railway operating income of $45,288,504, an 0.54 per cent return on their property investment, in the first five months of 1938, according to the Bureau of Railway Economics of the Association of American Railroads. In the first five months of 1937, the net railway operating income was $240,111,987 or 2.85 per cent, and in the first five months of 1930, it was $301,732,780 or 3.51 per cent on property investment. May's net railway operating income was $16,496,701 or 0.86 per cent, as compared with May, 1937's $44,239,456 or 2.32 per cent and May, 1930's $67,790,336 or 3.41 per cent.

CLASS I RAILROADS—UNITED STATES

	1938	1937	1930
Month of May			
Total operating revenues	$272,665,025	$352,542,542	$457,254,022
Total operating expenses	217,112,865	267,225,209	347,604,651
Taxes	28,504,530	30,124,344	30,532,352
Net railway operating income	16,496,701	44,239,456	67,790,336
Operating ratio—per cent	79.63	75.80	76.02
Rate of return on property investment—per cent	0.86	2.32	3.41
Five Months Ended May 31			
Total operating revenues	$1,354,268,701	$1,735,221,861	$2,218,877,128
Total operating expenses	1,113,769,976	1,293,047,978	1,717,945,937
Taxes	141,301,708	147,893,392	146,785,356
Net Railway operating income	45,288,504	240,111,987	301,732,780
Operating ratio—per cent	82.24	74.52	77.42
Rate of return on property investment—per cent	0.54	2.85	3.51

Gross operating revenues for the first five months of 1938 totaled $1,354,268,701 compared with $1,735,221,861 for the same period in 1937, and $2,218,877,128 for the same period in 1930, a decrease of 22.0 per cent below 1937, and 39.0 per cent below 1930. Operating expenses amounted to $1,113,769,976 compared with $1,293,047,978 in 1937, and $1,717,945,937 in 1930—13.9 per cent under the former and 35.2 per cent below 1930.

Class I roads in the five months paid $141,301,708 in taxes compared with $147,893,392 in 1937, and $146,785,356 in 1930; for May alone, the tax bill amounted to $28,504,530, a decrease of $1,619,814 or 5.4 per cent below May, 1937.

Sixty-four Class I roads failed to earn expenses and taxes in the first five months, of which 23 were in the Eastern district, 10 in the Southern District and 31 in the Western District.

Gross for May amounted to $272,665,025 compared with $352,542,542 in May, 1937, and $457,254,022 in May, 1930; operating expenses totaled $217,112,865 compared with $267,225,209 in the same month in 1937, and $347,604,651 in May, 1930.

Class I roads in the Eastern district for the five months had a net of $34,382,368, which was at the annual rate of return of 0.75 per cent; for the same period in 1937, their net was $156,968,377 or 3.45 per cent while in 1930 it was $177,734,373 or 4.15 per cent. The Eastern district gross

(*Continued on page 90*)

Accident Records

A typographical error occurred in the first sentence of the article on the derailment of the Olympian of the Chicago, Milwaukee, St. Paul & Pacific in the *Railway Age* of June 25, page 1050. In place of 1923, the first sentence should have read, "The greatest loss of life in a railway accident in the United States since 1925 . . ." On June 16, 1925, a Delaware, Lackawanna & Western passenger train was derailed near Hackettstown, N. J., because of earth and rocks being washed on the tracks at a point where they are crossed by a public highway.

Transport Workers Listed Among PWA's Beneficiaries

Workers employed on "transportation lines" are among those listed by Public Works Administrator Harold L. Ickes as prospective beneficiaries of the PWA's new 1938 program under which allotments had been made up to July 3 for a total of 2,595 projects, with a total estimated construction cost of $637,141,609. Mr. Ickes pointed out that Bureau of Labor Statistics estimates, based on a study of expenditures under the old PWA program, show that "for every man-hour of employment created at the site of a project, two and a half man-hours are created indirectly in the various industries supplying material and transportation."

To Continue Probe Of Canada Mergers

Dominion Senate body reaches no conclusions, but plans to pursue inquiry

The committee of the Canadian Senate which has been inquiring into the proposed "unification" of the Canadian Pacific and the Canadian National (urged by the former company) and "co-operative economies" (the alternative favored by the C. N. R.) has reached no conclusions. But the probers want to continue their studies and have unanimously recommended that their committee be re-appointed at the next session of Parliament. In the meantime, the committee urges the two railway companies to renew and speed up their efforts to effect economies by co-operation.

Following its presentation by George P. Graham (Liberal), Charles P. Beaubien (Conservative) urged engineering and accounting experts be named to go into the situation as revealed by the inquiry and report. Government Leader Raoul Dandurand answered that as the investigation had not completed its work he did not think the government should be asked to act upon the suggestion of Sen. Beaubien.

The report set out: "The evidence before the committee was not completed until very shortly before prerogation and consequently the committee has been unable, through lack of time, to analyze the vast mass of material before it in such manner as to enable it to present a report either satisfactory to itself or valuable to the public. The proceedings before the committee and the publicity given thereto must have contributed greatly to the information of all interested and should be of inestimable value in the further consideration of the problem by the government and people of this country.

"Having regard to the desirability of completing the inquiry, and to the preservation of the value of the examination already made, and the preparation of an adequate report thereon, the Committee recommends that it be re-appointed early in the next session of Parliament. The intention is that a thorough review shall be made of all evidence and other material already at the disposal of the committee, and a report thereon presented to Parliament.

"The committee may deem it advisable, when later reconvened, to obtain further data bearing upon the general problem and its possible solution.

"In the meantime, the Committee would request the two railway companies to renew and speed up their efforts to effect by co-operation reductions of operating expenditures by every means at their command, and within the authority of the present law."

Forty-three sessions were held by the committee during which 31 of the principal officers of the two railway systems were examined and 97 exhibits filed, many of them voluminous in content and technical in character. Testimony was taken also in extensive detail from representatives of the Dominion joint legislative committee of the transportation brotherhoods, with which was associated the Trades and Labor Congress of Canada, and also from the Canadian Brotherhood of Railway Employees. Recorded proceedings of the committee cover 1284 pages.

Senator Beaubien said the committee had decided to bring in an unanimous report; but there was a matter he wished to raise nevertheless. He believed it had been shown by the evidence that from $95,000,000 to $100,000,000 was the loss to the country through the C. N. R.—half of which represented interest payments. In view of the conflicting evidence of witnesses from the two railways, Senator Beaubien urged the government should appoint expert engineers and accountants to examine into the whole situation as brought to light by the probe.

The committee had not arrived at any findings and until it did so he believed the Senate should abstain from requesting the government to appoint expert engineers and accountants, Senator Dandurand said.

April Has Deficit Of $33,483,079

Compares with a net income of $3,823,704 for fourth 1937 month

Class I railroads reported a deficit, after fixed charges and other deductions, of $33,483,079 in April, 1938, as compared with an April, 1937, net income of $3,823,704, according to the Interstate Commerce Commission's monthly compilation of selected income and balance sheet items. For the first four months of 1938 the Class I carriers reported a deficit of $139,796,871 as compared with a net income of $19,214,427 for the same period of last year.

One hundred three roads reported deficits for April, 1938, and 30 reported net incomes; in April, 1937, 61 reported deficits and 72 reported net incomes. The consolidated statement showing the net income

SELECTED INCOME AND BALANCE-SHEET ITEMS OF CLASS I STEAM RAILWAYS

Compiled from 136 Reports (Form IBS) Representing 141 Steam Railways

(Switching and Terminal Companies Not Included)

TOTALS FOR THE UNITED STATES (ALL REGIONS)

For the month of April 1938	For the month of April 1937	*Income Items*	For the four months of 1938	For the four months of 1937
$9,236,818	$48,357,728	1. Net railway operating income	$28,791,803	$195,872,532
10,584,332	10,546,362	2. Other income	43,995,457	44,556,521
19,821,150	58,904,090	3. Total income	72,787,260	240,429,053
2,083,786	1,752,823	4. Miscellaneous deductions from income	8,455,070	7,239,392
17,737,364	57,151,267	5. Income available for fixed charges	64,332,190	233,189,661
		6. Fixed charges:		
10,362,259	11,966,098	6-01. Rent for leased roads and equipment	41,253,673	49,235,226
39,640,374	40,117,957	6-02. Interest deductions	157,963,787	159,696,114
202,536	233,067	6-03. Other deductions	858,607	925,233
50,205,169	52,317,122	6-04. Total fixed charges	200,076,067	209,856,573
*32,467,805	4,834,145	7. Income after fixed charges	*135,743,877	23,333,088
1,015,274	1,010,441	8. Contingent charges	4,052,994	4,118,661
*33,483,079	3,823,704	9. Net income	*139,796,871	19,214,427
16,801,565	16,321,579	10. Depreciation (Way and structures and Equipment)	67,136,783	64,915,628
753,792	3,055,715	11. Federal income taxes	3,832,774	11,352,108
		12. Dividend appropriations:		
1,269,992	1,934,347	12-01. On common stock	18,386,080	24,928,776
813,702	906,164	12-02. On preferred stock	4,546,903	4,915,812

Selected Asset Items	Balance at end of April 1938	Balance at end of April 1937
13. Investments in stocks, bonds, etc., other than those of affiliated companies (Total, Account 707)	$652,620,728	$688,989,703
14. Cash	$305,933,149	$468,374,609
15. Demand loans and deposits	8,010,846	7,909,876
16. Time drafts and deposits	19,674,157	43,113,460
17. Special deposits	57,441,076	270,492,746
18. Loans and bills receivable	3,766,100	9,278,286
19. Traffic and car-service balances receivable	47,966,525	63,803,998
20. Net balance receivable from agents and conductors	37,439,845	51,892,391
21. Miscellaneous accounts receivable	133,647,530	149,013,107
22. Materials and supplies	374,093,066	365,285,211
23. Interest and dividends receivable	21,645,570	25,931,517
24. Rents receivable	1,454,083	1,913,996
25. Other current assets	4,155,294	6,915,988
26. Total current assets (items 14 to 25)	$1,015,227,241	$1,463,925,185
Selected Liability Items		
27. Funded debt maturing within 6 months†	$212,561,395	$211,544,695
28. Loans and bills payable‡	$231,794,250	$200,174,997
29. Traffic and car-service balances payable	63,756,174	81,511,610
30. Audited accounts and wages payable	245,822,203	253,554,272
31. Miscellaneous accounts payable	57,913,757	126,029,494
32. Interest matured unpaid	710,168,375	575,705,580
33. Dividends matured unpaid	2,576,921	1,956,416
34. Funded debt matured unpaid	522,651,236	479,092,548
35. Unmatured dividends declared	1,364,969	1,649,433
36. Unmatured interest accrued	95,782,804	103,730,375
37. Unmatured rents accrued	34,552,512	36,194,390
38. Other current liabilities	20,997,721	28,850,430
39. Total current liabilities (items 28 to 38)	$1,987,380,922	$1,888,449,545
40. Tax liability (Account 771):		
40-01. U. S. Government taxes	$53,550,022	$127,335,446
40-02. Other than U. S. Government taxes	137,352,954	125,631,222

† Includes payments which will become due on account of principal of long-term debt (other than that in Account 764, Funded debt matured unpaid) within six months after close of month of report.

‡ Includes obligations which mature not more than 2 years after date of issue.

* Deficit or other reverse items.

NET INCOME OF LARGE STEAM RAILWAYS WITH ANNUAL OPERATING REVENUES ABOVE $25,000,000

(Switching and Terminal Companies Not Included)

Name of railway	Net income after deprec. For the four months of 1938	Net income after deprec. For the four months of 1937	Net income before deprec. For the four months of 1938	Net income before deprec. For the four months of 1937
Alton R. R.	* $865,370	* $70,984	* $744,679	$46,193
Atchison, Topeka & Santa Fe Ry. System#	* 6,313,279	940,030	* 2,359,675	4,681,205
Atlantic Coast Line R. R.	1,595,152	2,873,504	2,274,041	3,554,712
Baltimore & Ohio R. R.	* 9,379,380	83,854	* 6,938,645	2,491,671
Boston & Maine R. R.	* 2,080,143	623,491	* 1,539,660	1,157,899
Central of Georgia Ry.†	* 1,166,489	* 391,419	* 880,976	* 129,715
Central R. R. of New Jersey	* 1,343,223	* 489,208	* 870,301	* 7,734
Chesapeake & Ohio Ry.	3,123,357	10,367,605	5,893,103	13,110,160
Chicago & Eastern Illinois Ry.‡	* 756,325	* 67,977	* 547,726	132,073
Chicago & North Western Ry.‡	* 8,082,955	* 6,146,564	* 6,391,240	* 4,492,656
Chicago, Burlington & Quincy R. R.	* 2,061,739	881,616	* 383,319	2,482,784
Chicago Great Western R. R.‡	* 932,520	* 499,494	* 753,258	* 324,895
Chicago, Milwaukee, St. Paul & Pacific R. R.‡	* 7,818,227	* 5,391,082	* 5,916,714	* 3,587,202
Chicago, Rock Island & Pacific Ry.‡	* 5,497,724	* 4,687,900	* 4,111,868	* 3,333,139
Chicago, St. Paul, Minneapolis & Omaha Ry.	* 1,122,661	* 1,342,446	* 926,221	* 1,144,865
Delaware & Hudson R. R.	* 799,193	171,738	* 449,640	526,978
Delaware, Lackawanna & Western R. R.	* 1,478,594	464,433	* 653,506	1,307,084
Denver & Rio Grande Western R. R.‡	* 2,568,467	* 2,046,537	* 2,166,841	* 1,664,065
Elgin, Joliet & Eastern Ry.	* 409,322	674,675	* 74,731	969,306
Erie R. R. (including Chicago & Erie R. R.)§	* 4,958,127	985,534	* 3,700,338	2,256,854
Grand Trunk Western R. R.	* 2,190,693	79,154	* 1,813,935	419,469
Great Northern Ry.	* 6,058,501	* 3,557,035	* 4,817,216	* 2,350,416
Illinois Central R. R.	* 1,075,187	* 1,553,146	1,083,835	557,485
Lehigh Valley R. R.	* 1,644,320	93,407	* 915,218	852,879
Long Island R. R.	* 1,087,538	* 1,012,874	* 696,598	* 622,120
Louisville & Nashville R. R.	* 1,265,388	2,426,286	170,554	3,820,996
Minneapolis, St. Paul & Sault Ste. Marie Ry.‡	* 2,739,425	* 2,369,434	* 2,329,882	* 1,957,261
Missouri-Kansas-Texas Lines	* 1,805,174	* 495,532	* 1,367,291	* 101,168
Missouri Pacific R. R.‡	* 6,283,101	* 3,458,817	* 4,812,023	* 2,004,058
New York Central R. R.¶	*13,136,695	6,453,491	* 7,782,214	11,787,272
New York, Chicago & St. Louis R. R.	* 1,324,524	1,071,754	* 749,892	1,610,411
New York, New Haven & Hartford R. R.‡	* 4,806,112	* 788,305	* 3,681,801	349,229
Norfolk & Western Ry.	2,876,327	10,686,615	4,536,864	12,247,014
Northern Pacific Ry.	* 4,792,425	* 2,283,323	* 3,663,689	* 1,209,639
Pennsylvania R R.	* 4,973,531	9,229,515	3,283,819	17,401,893
Pere Marquette. Ry.	* 1,488,150	896,542	* 688,174	1,748,795
Pittsburgh & Lake Erie R. R.	15,944	1,208,411	765,288	1,782,051
Reading Co.	* 269,531	3,053,154	774,300	4,087,517
St. Louis-San Francisco Ry.‡	* 4,904,830	* 2,819,943	* 3,863,393	* 1,771,717
St. Louis Southwestern Lines‡	* 787,751	* 359,177	* 580,195	* 157,603
Seaboard Air Line Ry.†	* 1,967,129	* 496,399	* 1,287,848	135,817
Southern Ry.	* 3,068,321	1,736,354	* 2,046,553	2,784,522
Southern Pacific Transportation System‖	*10,492,656	* 152,895	* 7,724,258	2,501,623
Texas & Pacific Ry.	* 81,074	744,554	316,817	1,134,074
Union Pacific R. R. (including leased lines)	706,721	543,086	3,162,282	2,775,023
Wabash Ry.†	* 3,188,808	* 279,413	* 2,471,576	430,149
Yazoo & Mississippi Valley R. R.	* 258,82[illegible]	204,663	* 78,275	368,977

† Report of receiver or receivers.
‡ Report of trustee or trustees.
§ Under trusteeship, Erie R. R. only.
# Includes Atchison, Topeka & Santa Fe Ry., Gulf, Colorado & Santa Fe Ry., and Panhandle & Santa Fe Ry.
¶ Includes Boston & Albany, lessor to New York Central R. R.
‖ Includes Southern Pacific Company, Texas & New Orleans R. R., and leased lines. The report contains the following information: "Income reported hereon excludes offsetting debits and credits for rent for leased roads and equipment and bond interest, between companies included herein. Interest on bonds of, and rental income from, separately operated solely controlled affiliated companies, whether earned or not, are included in this statement, in order that such income credits will offset income debits reflected in the net deficit of such companies. Operations of all separately operated solely controlled affiliated companies, resulted in a net deficit of $2,676,335 for the four months ended April 30, 1938 and $964,983 for the four months ended April 30, 1937, which is not reflected in this statement.
* Deficit.

of roads having annual operating revenues above $25,000,000 is given in the accompanying tables.

I. C. C. Probes State Refusals to Allow Ex Parte 123 Increases

The Interstate Commerce Commission has instituted upon its own motion investigations to determine whether the refusal of the Pennsylvania Public Utility Commission and the Railroad Commission of Texas to permit increases in intrastate rates following the Ex Parte 123 decision results in unjust discrimination against interstate commerce. Hearings in the Pennsylvania case, which involves only rates on anthracite coal, will open before Examiner Treazise at Harrisburg, Pa., on July 20. The Texas proceeding has not yet been assigned for hearing.

Overseas Highway Is Dedicated

The Overseas Highway which connects the mainland of Florida with Key West and which was built on the roadbed of the Florida East Coast's Key West extension, was formally dedicated on July 4. The highway cost $30,000,000 and was constructed with the aid of a PWA allotment. Although the road was dedicated on July 4, it was placed in operation on March 29. The highway is a toll road and tolls for travel have been set at $1 per car and driver for the entire trip, and 25 cents for each additional passenger.

Briefs Are Filed In Coal Rate Case

Briefs have been filed in the case of the Property Owners' Committee et al. vs. the Chesapeake & Ohio et al. by the Property Owners' Committee, the Trunk Line and New England Carriers, interveners, and the Chesapeake & Ohio et al. The issue in the case, according to the brief of the C. & O. and its co-defendants, the Norfolk & Western and the Virginian, is the future reasonableness of (1) rates on bituminous coal, in carloads, published from mines in Virginia, southern West Virginia, and eastern Kentucky to Newport News, Lambert Point and Sewalls Point, Va., for transshipment by vessel to points outside the Virginia Capes, and (2) the additional charge for dumping coal from cars to vessel at the above-mentioned ports.

The complainants include the principal associations of bituminous coal producers in the above-mentioned states, while the defendants are the C. & O., N. & W., and Virginian.

Air Traffic in May

The 19 scheduled air lines operating in continental United States during May carried 119,293 passengers and 499,980 lb. of express, flying respectively 48,812,927 passenger-miles and 311,348,692 express pound-miles, according to reports received by the U. S. Department of Commerce's Bureau of Air Commerce. In May, 1937, the 20 lines then reporting carried 98,035 passengers and 591,011 lb. of express, flying respectively 42,019,428 passenger-miles and 342,175,590 express pound-miles.

Would Give M. P. Subsidiary "Grandfather-Clause" Rights

Examiner G. P. Werner has recommended in a proposed report that the Interstate Commerce Commission grant "grandfather-clause" certificates to the Missouri Pacific Transportation Company, subsidiary of the Missouri Pacific, for the continuance of common-carrier bus operations over various specified routes between points in Arkansas, Colorado, Illinois, Kansas, Louisiana, Mississippi, Missouri, Nebraska, Tennessee and Texas. The Examiner would also permit the applicant to provide special-party or charter service from any point on the routes involved to any point in the United States.

Rutland Seeks Abandonment; Also Announces Wage Cut

George L. R. French, receiver for the Rutland, on July 5 petitioned the federal District Court at Rutland, Vt., for permission to sell or abandon the entire 413-mile system, extending roughly from Ogdensburg, N. Y., on the St. Lawrence river, to Chatham, N. Y., and Bellows Falls, Vt. A public hearing has been set for July 19. Mr. French bases his petition on the claim that present revenues do not justify the continued operation of the road.

Two days previously, on July 3, the receiver announced a 15 per cent wage cut for all employees of the road, to be effective August 4. This action, it is reported, follows a refusal of local railroad union leaders to accept a voluntary wage cut as suggested by the receiver. A hearing will be held in Rutland on July 11.

Five More Fusion-Welded Tank Cars

The Interstate Commerce Commission, by Commissioner McManamy, has authorized the General American Transportation Corporation to construct five tank cars fabricated by fusion-welding for experimental service in the transportation of butyraldehyde. The report—a supplemental one in No. 3666, In the Matter of Regulations for the Transportation of Explosives and Other Dangerous Articles—states that the application, which was approved by the Tank Car Committee and

Bureau of Explosives Association of American Railroads, was the first for authority to employ fusion-welded tank cars for butyraldehyde; although previous decisions have granted applications for authority to build a total of 522 such cars for experimental service in the transportation of "dangerous articles other than explosives."

B. & O. Places Diesels on N. Y.-Capital Runs

The Royal Blue and the Columbian, streamlined trains of the Baltimore & Ohio, making round-trips daily between New York and Washington, D. C., are now operated by 3,600 hp. Diesel-electric locomotives. The extension of Diesel power to regular service on these trains was effected with the recent delivery to the B. & O. of two new locomotives from the La-Grange, Ill., plant of Electro-Motive Corporation. They are alike in every way to the four predecessors that were assigned some months ago to the Capitol Limited and the National Limited.

PWA Cannot Finance Shipstead Proposal

Public Works Administrator Harold L. Ickes has written a letter to Senator Shipstead, Farmer-Laborite of Minnesota, in which he points out that although the PWA has authority to make certain types of loans for railroad equipment, it does not have the funds to finance such a car-rental plan as the Senator had proposed without additional funds for that purpose being advanced by Congress. Mr. Ickes suggested that Senator Shipstead might consult the Reconstruction Finance Corporation to ascertain whether or not that agency had funds that might be used to carry out his proposal which was reviewed in detail in last week's issue of *Railway Age*.

Senator Shipstead is at present in Minnesota and could not be reached for comment, but it is understood that he will confer with the RFC regarding the proposal. Chairman Jones indicated on July 6 that he had not yet heard from the Senator.

More Rivers and Harbors Allotments

The Secretary of War has approved a second group of allotments from the War Department Civil Appropriation Act for 1939, for new work on rivers and harbors. Included in the list are such items as $1,000,000 for work on the Great Lakes to Hudson River Waterway, New York; $1,141,300 for work on the inland waterway from Cape Fear River, North Carolina, to Winyah Bay, South Carolina; $300,000 for work on the Mississippi River between the Ohio and the Missouri Rivers; $300,000 for work on the Missouri River from its mouth to Kansas City, Mo.; $2,354,000 from Kansas City, Mo., to Sioux City, Iowa; $731,000 for work at Fort Peck, Mont.; $1,000,000 for the Detroit River in Michigan; $1,000,000 for debris restraining dams on the Sacramento River in California; $1,600,000 for the Cape Cod Canal in Massachusetts; $3,250,000 for the Great Lakes to Hudson River Waterway, New York; $1,991,450 for work on the Mississippi River between the Missouri River and Minneapolis; $1,000,000 for the Missouri River, Kansas City to Sioux City; and $1,700,000 for the Missouri River at Fort Peck, Montana.

Scottish Roads to Experiment with All-Commodity Rates

The London & North Eastern and the London, Midland & Scottish (Great Britain) have been permitted by the Railway Rates Tribunal to institute a system of flat commodity rates between Glasgow, Scotland, and Aberdeen, Dundee and Perth, the rates to apply experimentally from June 15, 1938, to June 30, 1939, according to an editorial appearing in the "Railway Gazette" of London, England. Under this system of rates, shippers may send bulk consignments, either mixed or single, between Glasgow and any of the other three points without regard to classification, but pay a fixed rate per ton for the service. The new rates do not affect existing lower rates for low-grade commodities and do not apply to fluids carried in private tank cars or explosives of any description. It is stated in the editorial that the new rates have been instituted in an effort to place railroad companies on a competitive basis with highway transport operators, who, it is stated, base their charges on cost rather than upon a system of value classification.

Argentina Runs First Streamliner on 435-Mile Route

Argentina's first air-conditioned, streamlined train—an express traveling between Buenos Aires and Cordoba—has recently been put into service by the Central Argentine. Finished in blue and silver, the new train, named "El Cordobes," carries four well-appointed chair coaches—seating 230 passengers all told—two dining cars and a baggage car and makes two round trips per week between the two termini, with a short stopover at Rosario. A small extra fare is charged.

The coaches are equipped with double, adjustable, leather upholstered revolving chairs, having removable white linen headrest slips. Floors are heavily carpeted, while the double windows are fitted with adjustable venetian blinds which raise vertically between the two panes of glass and may be operated by the passengers. A compartment has been installed at the end of each chair coach for large valises and baggage. Electric call bells, and a special inter-car telephone are provided.

The new train has a daylight run and makes the 435-mile run between Buenos Aires and Cordoba in 9½ hours, or an average speed of 46 m. p. h.

N. Y. Drops Three Billion in Railroad Issues from Legal List

Some $3,163,931,000 face amount of railroad bonds have been removed from the list of legal investments for savings banks in New York state, effective July 1, according to the annual list of additions and removals issued by the State Banking Department. These wholesale removals of railroad securities, believed to be the largest total of any one industry ever to be stricken from the legal list, result from a change this year in the state banking law to require that railroads, to have their issues included in the legal list of securities, must have earned their fixed charges for a continuous five-year period, including the fiscal year preceding the time of investment, thus amending a "moratorium" which heretofore has eased railroad investment requirements.

Of the railroad issues removed from the banking investment list, 26 issues, having a face amount of $29,384,000, were dropped because of maturity, while 230 issues, having a face amount of $3,134,547,000, were "disqualified" by their inability to meet requirements. Included in the removals were 56 equipment trust groups issued by 21 railroad corporations.

The "additions" list included six railroad securities issues having a face amount of $44,785,000, five of which were equipment trusts.

New German Diesel-Electric Embodies New Features

The German State Railways is experimenting with a new type of Diesel-electric train which rests upon springs fitted directly to the floor of the body frame and in which the Diesel engines and generators are installed in the protruding part of the front car, where, it is claimed, they are subject to a minimum of shocks. The train, which consists of three cars having a total length of 70 meters (229.6 ft.) has a dead weight of 113 metric tons, develops an average speed of 160 km.p.h. (99 m.p.h.) and can accommodate 100 passengers, according to consular reports. It differs from the conventional type of Diesel-electric train in that its two 600-hp. Diesel engines and their respective generators are carried in the forward part of the leading car and do not rest directly on the main trucks, as is customary in European practice. Furthermore the train rests on its main springs at the floor of the body frame instead of through the trucks. These springs are of a specially-designed transverse type and aid resistance against lateral movements in passage around curves.

N. Y. Crossing Elimination Relief Advanced by Vote

The Moses proposed amendment to the New York State Constitution, which would place the entire cost of grade crossing eliminations on the state and relieve the railroads from the 50 per cent share of costs now levied upon them, has been advanced to a third reading by a vote of 99 to 42 of the convention members sitting as a committee of the whole on the evening of July 5. One more vote is required to pass or reject the proposal in its final form.

Strong support for the measure was given by former governor Alfred E. Smith, who declared that the proposal was not offered as a means of helping the railroads, but of hastening the obligation of the state "to protect the people on the highways". Answering the strenuous objections to the plan made public earlier in the week by Milo R. Maltbie, chairman of the state

Public Service Commission, Mr. Smith charged the commission with delaying crossing elimination projects unduly and urged enactment of the proposal as the only means of speeding needed eliminations. As for the suggestion that the carriers be asked to contribute a portion of crossing removal costs, Mr. Smith asked, "Who wants to borrow from the fellow that's broke?"

Rates on Vegetable Oils

Examiner John McChord has recommended in a proposed report that the Interstate Commerce Commission find unduly prejudicial and unduly discriminatory the higher rates charged on domestic shipments of cottonseed oil, soy bean oil and other vegetable oils in carloads or in tank carloads, than are contemporaneously charged on import shipments of the same commodities shipped in like manner over the same routes. The examiner would order the removal of the undue prejudice while at the same time finding that the domestic rates involved are not unreasonable.

The proposed report is in No. 27747, The Mississippi Cotton Seed Crushers Association v. Atlanta, Birmingham and Coast Railroad Company et al.; and the assailed rates are "between points in continental United States, principally between points in Alabama, Arkansas, Arizona, California, Indiana, Kentucky, Georgia, Florida, Louisiana, Mississippi, Missouri, New Mexico, New York, North Carolina, South Carolina, Oklahoma, Ohio, Tennessee, Texas, Virginia, Iowa, Illinois, Montana and Wisconsin."

The proposed report points out that while the complaint puts in issue the reasonableness of the domestic rate, its main purpose is to have rates on a parity in all cases for the transportation of domestic and imported vegetable oil and the commodity from which it is made or produced.

Santa Fe Highway Routes

Joint Board No. 52, composed of John E. McCulloch of Kansas, has recommended in a proposed report that the Interstate Commerce Commission find that the Santa Fe Transportation Company, with respect to the routes involved, is neither a common nor a contract carrier within the meaning of the Motor Carrier Act. From its review of the Atchison, Topeka & Santa Fe subsidiary's operations the Board reaches the conclusion that "the Transportation Company is but a division of the railway or a motor-carrier section thereof, created for the sole purpose of facilitating the movement of l.c.l. freight handled by the railway."

The Board goes on to find that the motor vehicle operations involved "are those of the railway" and thus it would give the latter "grandfather-clause" certificates for both truck and bus operations between Strong City, Kans., and Eldorado. Also, it would grant common-carrier truck certificates for extensions of operations over routes between Atchison, Kans., and Topeka and between Hutchinson and the Kansas-Colorado state line.

The Board would, however, have the commission find that public convenience and necessity do not require the extension of common-carrier truck operations over a route between Florence and Arkansas City; although it would grant common-carrier bus certificates for such a route as well as for that between Attica and Belvidere.

Freight Car Loading

Loading of revenue freight for the week ended June 25 totaled 558,937 cars, an increase of 3,368 cars or six-tenths of one per cent above the preceding week, but a decrease of 211,008 cars or 27.4 per cent below the corresponding week in 1937 and a decrease of 361,708 cars or 39.3 per cent below the same week in 1930. All commodity classifications except ore and coke showed increases over the preceding week, while all commodity classifications except grain showed decreases under last year. The summary, as compiled by the Car Service Division, Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, June 25			
Districts	1938	1937	1936
Eastern	118,424	155,641	151,665
Allegheny	99,938	157,736	140,600
Pocahontas	35,416	47,843	48,298
Southern	80,022	101,269	96,575
Northwestern ...	78,395	131,279	114,987
Central Western.	100,209	120,043	105,606
Southwestern ...	46,533	56,134	55,857
Total Western Districts	225,137	307,456	276,450
Total All Roads.	558,937	769,945	713,588
Commodities			
Grain and Grain Products	41,996	40,899	41,727
Live Stock	10,584	12,403	12,811
Coal	86,855	113,537	114,157
Coke	4,098	9,570	8,336
Forest Products.	26,633	39,567	36,030
Ore	22,771	74,370	49,462
Merchandise l.c.l.	145,461	166,772	161,300
Miscellaneous ...	220,539	312,827	289,765
June 25	558,937	769,945	713,588
June 18	555,569	752,787	690,667
June 11	553,854	750,500	686,643
June 4	502,624	688,987	695,844
May 28	562,061	790,503	646,812
Cumulative Total, 25 Weeks	13,641,438	18,237,829	16,049,958

In Canada.—Car loadings for the week ended June 25 totaled 43,397, which was an increase of 220 cars over the preceding week but a decrease of 5,971 under last year, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
June 25, 1938	43,397	18,426
June 18, 1938	43,177	18,869
June 11, 1938	41,466	19,946
June 26, 1937	49,368	26,027
Cumulative Totals for Canada:		
June 25, 1938	1,098,280	528,373
June 26, 1937	1,188,576	700,581
June 20, 1936	1,078,917	588,773

The Canadian Roads in May

The Canadian National has reported a net revenue deficit for May of $478,614, as compared with net operating revenues a year ago of $1,666,250, the reduction being $2,144,864. Gross revenues for the month were down $2,961,148, but the contraction in operating expenses was only $816,284. Operating revenues totaled $13,909,678, operating expenses $14,388,292.

For the first five months of the year the Canadian National had a net operating revenue deficit of $4,909,400, gross at $69,057,315 being down $9,847,098 while operating expenses at $73,966,715 were up $1,295,063. A year ago operating revenues totaled $78,904,413, operating expenses $72,671,652 to leave net operating earnings of $6,232,761.

Earnings of the Canadian Pacific contracted sharply during May, gross for the period amounting to $10,562,620 as compared with $11,834,197 a year ago, a drop of $1,271,576, while net operating earnings are shown at $422,118 after deducting operating expenses of $10,140,502. Net operating earnings for May, 1937, were $1,574,219.

For the five months to the end of May gross earnings dropped $4,228,714 as compared with the corresponding period of last year, amounting to $51,142,584 as compared with $55,371,298. Operating expenses for the five months increased $666,708, resulting in net operating earnings for the period of $2,169,620 as against $7,065,042 for the same period of 1937, a decrease of $4,895,422.

Equipment Depreciation Rates

Equipment depreciation rates for 14 railroads, including the Missouri Pacific, the Chicago & Eastern Illinois and the Wheeling & Lake Erie, are prescribed by the Interstate Commerce Commission in a new series of sub-orders and modifications of previous sub-orders in No. 15100, Depreciation Charges of Steam Railroad Companies. The composite percentages, which are not prescribed rates, range from 3.35 per cent for the Tonopah & Goldfield to 15.82 per cent for the Okolona, Houston & Calhoun City.

The Missouri Pacific's composite percentage of 3.71 per cent is derived from the following prescribed rates: Steam locomotives, 3.47 per cent; other locomotives, 3.93 per cent; freight-train cars, 3.97 per cent; passenger-train cars, 3 per cent; floating equipment (leased), 2.91 per cent; work equipment, 3.65 per cent; work equipment (leased), 4.7 per cent; miscellaneous equipment, 10.98 per cent. The composite percentage for the C. & E. I. is 3.6 per cent, derived from prescribed rates as follows: Steam locomotives, 3.5 per cent; other locomotives, 4.85 per cent; freight-train cars, 3.54 per cent; passenger-train cars, 3.66 per cent; floating equipment, 4.78 per cent; work equipment, 5.27 per cent; miscellaneous equipment, 25 per cent. The W. & L. E. composite percentage is 3.71 per cent with prescribed rates as follows: Steam locomotives, 3.69 per cent; freight-train cars, 3.72 per cent; passenger-train cars, 4.39 per cent; work equipment, 3.47 per cent; miscellaneous equipment, 15.65 per cent.

Shippers Aid Carriers in Car Service Campaign

Active support by shippers of the carriers' campaign for observance of car service rules is being sought in various ways by individual Shippers Regional Advisory boards. The Atlantic States board, for example, created a special committee of shippers at its last meeting to carry on an aggressive campaign among their own

fellows, while important industrial traffic men in the region of the Southeast board have made public the efforts of their organizations in educating employees in the proper handling of freight cars. Recent meetings of the Southwest and Pacific Coast boards have also devoted special attention to car service problems.

As chairman of the special shipper committee on car handling appointed by the Atlantic States Advisory board, E. W. Kerwin, general traffic manager, Loose-Wiles Biscuit Company, has distributed copies of a letter to all shipper members of the board, soliciting their aid in "supporting the railroads' efforts to eliminate waste in car handling." This support is best rendered, he writes, by educating those who load, unload or move cars in the principles of good handling practices.

Specifically, he suggests to shippers that they: (1) study sources of car supply and future shipping needs; (2) see that employees advise the carriers of car supply needs "in ample time to permit selection of suitable ownership cars from yard holdings;" (3) help reduce extra switching movements; and (4) instruct loading forces to make use of the car selection chart distributed by the A. A. R.

Central Territory Motor Carriers Denied Rate Cuts

The Interstate Commerce Commission, Division 5, has found unlawful proposed reduced rates and regulations and practices which would result in reduced charges of carriers by motor vehicle for application to the transportation of property in interstate or foreign commerce between points in Illinois, Indiana, Ohio, Michigan, Wisconsin, and portions of Iowa, Kentucky, New York, Pennsylvania, and West Virginia.

The commission pointed out that "The rates in the proposed schedules considered as a whole if permitted to become effective would further aggravate the generally unsatisfactory financial condition of motor carriers in central territory. There is a strong indication throughout that if the proposed rates take effect other carriers who are in competition with the respondents will reduce their rates to meet the proposed rates. In the suspended schedules, there may be some rates which will earn revenues above the cost of service plus a reasonable profit, but such rates can not be singled out for special treatment herein by reason of the limitations of the record."

"The present downward trend," the Commission said, "in the rate level of motor carriers in central territory must be arrested if we are to effectuate the policy of Congress declared in section 202 (a) of the Motor Carrier Act, 1935, to foster sound economic conditions in transportation by motor vehicle and among motor carriers. This policy can only be carried into effect by the cancellation of the proposed rates and charges, which, considered as a whole, are, we believe, less than reasonable minima."

The changes proposed in the suspended schedules include some reductions in the amount of the class rates themselves, as well as reductions in commodity rates. They also include the establishment of commodity rates in lieu of the class-rate bases, the publication of more general commodity descriptions, larger lists of articles, than those upon which present commodity rates are applicable, and reductions in minimum charges of contract carriers, all of which, the commission believes, would have the effect of reducing revenues and be inductive of other reductions in the rates of competing carriers engaged in the transportation of like commodities.

French Learning American Packing Methods

At the request of the French railroads, packing and shipping experts of American railroads "are showing Europe how to pack fragile and valuable articles in an economical and efficient manner," according to the Association of American Railroads. Outstanding examples of packing and shipping methods as developed by the Freight Container Bureau of the Association are now being displayed at the Paris International Trade Fair. After the close of the fair in June, the exhibit will tour France in an exposition train sponsored by the French National Railroads. The purpose of the special train is to instruct manufacturers and farmers in the art of proper packing.

Selected by a representative of the French railway system, the exhibit, which has been seen in different parts of this country and Canada, includes model containers and crates. There are also many bulletins, circulars and photographs illustrating and describing American practices in the packing and cushioning of various commodities to protect them against loss and damage in both domestic and foreign commerce. Much of this material has been translated into French.

Along with this exhibit are copies of the regulations prepared by the Freight Container Bureau, giving specifications for containers used in the fresh fruit and vegetable traffic and rules for loading. According to the Association of American Railroads, the French Government has evinced considerable interest in these tariffs, and will probably employ them as a basis for preparing any similar ones adopted by the French railroads.

Camp and July 4 Travel Only "Fair to Middlin'"

Movements of youngsters to camps and the usual exodus of city dwellers to mountains and beaches during the week-end of July 4 combined to keep passenger terminals in New York City humming, but were, on the whole, a little below the volume of similar traffic during the same period of last year. Most roads reported either a similar or slightly decreased volume in both types of travel, placing the blame on the "recession." The Baltimore & Ohio, however, reported an 8 per cent increase in outbound and an 11 per cent increase in inbound traffic.

The Central of New Jersey attributed the decline in its seashore business, both by rail and Sandy Hook route steamers, to the coolness of the weather and the consequent shift away from beaches to the hinterland resorts. The New York, New Haven & Hartford, on the other hand, enjoyed a substantial increase over last year in traffic to Cape Cod resorts, even taking the abandonment of its Sound boat lines into account. Its camp business was about the same as two years ago. The New York Central carried 12,000 youngsters out of Grand Central terminal during the week of June 27, and operated 165 extras in and out of the terminal during the period July 1 to 5, inclusive.

The Boston & Maine and the Maine Central announce that some 15 special trains and 382 extra Pullman cars and coaches were assigned to the movement of young campers into New England from various points in the country. The great rush for camp sites started on June 27 and reached a peak on Friday, July 1. It was estimated that over 2,000 camping juveniles passed through North station, Boston, Mass., on that date.

Transportation Division in Bureau of Agricultural Economics

The establishment of a Division of Transportation in the Bureau of Agricultural Economics, with Dr. Ralph L. Dewey acting in charge, was announced last week by C. W. Kitchen, acting chief of the Bureau. Dr. Dewey, who assumed his duties on July 1, was formerly in charge of transportation studies at Ohio State University and has been associated with transportation activities in varous Government agencies, including the Department of Commerce.

The Bureau of Agricultural Economics has been designated by Secretary of Agriculture Wallace as the agency to administer Section 201 of Title II of the Agricultural Adjustment Act of 1938 relating to transportation of farm products. Section 201 of the Act authorizes the Secretary of Agriculture "to make complaint to the Interstate Commerce Commission, with respect to rates, charges, tariffs, and practices relating to the transportation of farm products," and to appear before the commission at hearings held upon complaint filed by others. The section provides, also, that the Secretary may be made a party to proceedings affecting the public interest, and may have the right to invoke and pursue original and appellate judicial proceedings involving the commission's determination. The Secretary is authorized to cooperate with and assist cooperative associations of farmers making complaint to the Interstate Commerce Commission.

Secretary Wallace, the statement recalls, "has announced that the work of the Bureau of Agricultural Economics will include the assembling of basic data on transportation rates by rail and truck, volume and movement of traffic in agricultural commodities, transportation charges and practices and their effect upon agriculture, preparation of economic briefs and other specific documents necessary in connection with appearance by the Secretary before the commission, and any other work that may be necessary to the effective administration of the transportation section of the Act."

Dr. Dewey was born on a farm at Solon,

Ohio, in 1901; was educated at Oberlin College, Ohio State University, and the University of Michigan. He received A.B. and A.M. degrees at Ohio State University, and a Ph.D. degree at the University of Michigan. He majored in economics, "with special emphasis on transportation and public utilities," and "has specialized in transportation matters since his undergraduate days." He taught economics at the University of Michigan from 1924 to 1929, and from then until 1935 he was in charge of transportation work in the Department of Economics at Ohio State University. In 1935 he entered government service, first with the Federal Power Commission, and later with the Department of Commerce as Chief of the Division of Transportation in the Bureau of the Census and the Bureau of Foreign and Domestic Commerce.

Dr. Dewey was a member of the staff of the National Transportation Committee (the so-called "Coolidge Committee") which sponsored in 1932-33 a study of the transportation system of the United States; was author and co-author of chapters of the committee's report on freight and passenger rates, and the regulation, valuation, rate of return, consolidation, and the history of transportation.

New Haven Trustees Answer Old Colony Curtailment Query

H. S. Palmer and H. B. Sawyer, two of the three trustees of the New York, New Haven & Hartford and of the Old Colony, submitted an answer on June 27 to the U. S. District Court at New Haven, Conn., to a petition filed by the Mutual Savings Bank Group Committee on New Haven Railroad Bonds, the Protective Committee of Shareholders of Old Colony Railroad Company and the Old Colony itself, asking the court to direct the trustees to effect economies in the local passenger operations of the Old Colony, which, it is claimed, now consume the assets of the road and impair the interests of stockholders and creditors.

The trustees' statement first admits the charges of petitioners; then goes on to point out that the local passenger services of the Old Colony are closely interrelated with operation of certain New Haven lines in and around Boston, Mass., which are subject to the lien of the New England Railroad Company Consolidated Mortgage. Since these latter routes are also operated "at a substantial loss," set at approximately $337,190 annually, the trustees assert, the proposed economies may not be fully realized unless similar economies are effected on the lines of the New England. Annual savings of more than $783,919 can be realized by operating both the Old Colony and New England local services in accordance with schedules which are at present before the Massachusetts Public Utility Department (See the *Railway Age* for March 25, page 584) and an additional $229,502 be saved annually by other economies and by abandonment of certain lines, applications for which are pending before the Interstate Commerce Commission. Breaking these proposed economies down according to corporate units, the trustees estimate that annual savings on the Old Colony would be in excess of $658,899, on the Boston & Providence (leased road of the Old Colony) more than $220,139 and on the New England more than $134,383.

These schedules have not been put in effect as yet because the trustees, at the request of the state utility body, agreed to operate passenger service on existing schedules until completion of hearings. The trustees recommend that the proposed changes and economies be effected as soon as possible.

More Trespassers Ejected: A. A. R. Report Stresses Hazards

An increase in the first four months of 1938, compared with the corresponding periods in 1937 and 1936, in the number of trespassers ejected from railroad property but not arrested was shown in a report made public July 5 by the Committee on Trespassing of the Protective Section, Association of American Railroads. Trespassers ejected in the first four months' period this year, according to the report, totaled 1,040,760, an increase of 125,853 or 13.8 per cent compared with the same period last year, and an increase of 48,019 or 4.8 per cent compared with the same period in 1936.

Reports as to casualties among railroad trespassers in the four months' period are not complete, but in the first three months of 1938, fatalities to trespassers resulting from accidents totaled 440 and 439 were injured. In the same period in 1937, 496 trespassers were killed and 457 were injured.

"The above mentioned figures," the report pointed out, "depict the magnitude of the trespassing problem, but from the personal injury standpoint this situation presents a more serious aspect. This is readily apparent when one considers that trespasser casualties comprise approximately 50 per cent of all casualties on railroads, including accidents at highway-grade crossings, over which the railroads have little or no control. Another point worthy of serious consideration is the fact that approximately 50 per cent of all trespasser casualties result fatally.

"Your committee is strongly of the opinion that in order to effect an improvement in this situation, education of the public, as to the hazards of trespassing on railroad property, is the most effective. The sooner the public in general, and young boys and girls in particular, realize the dangers incidental to trespassing on railroad property, the sooner we will see a material reduction in the casualty figures."

P. R. R. Sells Power Plant; Will Buy "Juice" From Utility

The Pennsylvania and the Long Island have contracted with the Consolidated Edison Company of New York, Inc., to supply electric power for their operations in the New York area, thus discontinuing all generation of traction power in railroad plants. Under the terms of the contract, which will run for ten years, Consolidated Edison will take over the operation and maintenance of the railroads' Long Island City power plant, which heretofore has been their main source of power in the metropolitan district.

George LeBoutillier, vice president at New York, estimates that at the present rate of use, about 290,000,000 kilowatt hours of electrical energy will be supplied annually under the contract, at substantial savings to the railroads as compared with the present cost of producing power at their own plant. Furthermore, power will be furnished on a scale of charges which makes due allowance for the use by the electric companies of the railroads' Long Island City power plant, which, under the contract, will become an integral part of the Consolidated Edison system. The Brooklyn Edison Company, Inc., an affiliate of Consolidated Edison, has for some years supplied to the Long Island about 30,000,000 kilowatt hours of electricity annually, so that the new contract represents increased purchases by the railroads of approximately 260,000,000 kilowatt hours per year. The present contract with the Long Island Lighting Company, which furnishes current to the Long Island outside of the district served by the Consolidated Edison Company, will remain as at present.

The Pennsylvania and Long Island will spend approximately $400,000 in making alterations and connections to pick up electricity from the power companies, according to Mr. LeBoutillier, while Consolidated Edison and its affiliated companies will spend about $500,000 in establishing similar connections with the railroads' lines.

Congressmen Discuss Railroad "Problems"

The July 5 issue of the Congressional Record, carrying further "extensions of remarks" of various congressmen, contains discussions of the railroad problem by Representatives Pettengill, Democrat, of Indiana, Moser, Democrat, of Pennsylvania, and Wolverton, Republican of New Jersey.

Representative Pettengill begins his address, which is entitled, "Starving the Iron Horse—The Problems of the Railroads", by asserting that the next Congress will have to deal with the railroad problem. Calling the railroad situation "extraordinarily critical", Mr. Pettengill goes on to say that "It is the most dangerous immediate threat to the whole national economy". He feels that the condition of the railroads is not the result of the immediate depression although it has made it worse.

Citing some statistics, Representative Pettengill states that for all class I roads for the five years 1932-36 net income after fixed charges, including interest, averaged only $2,043,087, or one-quarter of one per cent on equity securities or common and preferred stock of $8,029,964,698. This is, he continued, a five year average of two bits on $100 of stock as against 5¾ per cent considered a fair capital return only a few years ago. Also, according to the Representative, not a single railroad serving New York City has operated in the black since the beginning of this year.

"Western railways", he said, "in January did not earn even enough to pay operating expenses and taxes. If their capitalization were scaled down to zero and the invest-

ment of their owners confiscated by the government, as was recently done by Mexico with reference to petroleum, we would still have a serious railroad problem in western territory. And the contagion spreads."

He then points out that the matter has become so serious that last week the State Banking Department of the State of New York removed 230 railroad issues, in the total principal amount of $3,163,931,000, from the legal list of investments which savings banks of that state are permitted to invest their depositors' money in. Representative Pettengill believes that these facts indicate clearly that no hope for an upturn in business is going to solve the problem.

Admitting the government ownership is an alternative, he says that he does not believe that this country wants that and cites the case of the government-owned Canadian National in Canada. Mr. Pettengill is of the opinion that the real trouble with the iron horse is that "he has been given political answers to his economic needs." "The real difficulty of the railroads", he added, "is constantly decreasing income per dollar of gross business. Unless we recognize this fact, the financial pernicious anemia of the railroads will continue."

Representative Moser, in discussing the subject of land grants to railroads, remarked that "To many persons, especially those familiar with the land deals on which the present rate reductions are based", the bill to force the government to pay the going commercial rate on land grant roads "seems a just and equitable proposal". Representative Wolverton took the Administration to task for allowing the Congress to adjourn without doing anything to relieve the railroad situation. He charged that the Administration must assume the responsibility for the outcome of the railroad crisis because of its "failure and unwillingness to act".

Col. Wilgus Warns Nation on Army Transport Defects

Colonel William J. Wilgus, director of railways and deputy director general of transportation, A. E. F., during the World War, drafted privately during 1936 a discourse entitled "A Military Defect," which he defined as "a note of warning" to the nation on the unsatisfactory provisions now made by the U. S. Army for transportation of troops and supplies in time of combat. This draft has recently been published by order of the Transportation Corps, A. E. F. Association, and incorporated with a reprint of an address delivered by Col. Wilgus in New York last May and reviewed in the *Railway Age* of May 28, page 924.

In "A Military Defect" the writer charged the War Department with failure "to realize that transportation is quite as much of an art as military strategy and tactics" and sounded the fear that the country would engage in its next war as inadequately prepared for transportation efficiency as it did in the World War. The primary fault of our pre-war army set-up, according to Col. Wilgus, lay in the division of responsibility for transportation between the Engineer Corps and Quartermaster Corps,—"neither of which was fitted by training and experience for the mastery of that calling." This fault will be repeated, the writer warned, unless steps are taken to build a new military transport unit.

He devoted the greater part of his paper to a detailed review of the unsatisfactory operation of the army transportation units during the last war, in which he declared that the threatened break-down of transportation at that time "might have resulted in the recording of a different tale on the pages of history . . . had not the enemy succumbed when he did." Extending this theme, he wrote: "Our War Department, in its treatment of Army transportation, has not profited by the lessons of the past. In returning, as it has, to the demonstrated pre-war error of dividing this responsibility between two arms of the service both unfitted for the task, it is violating the generally accepted principle that a peace-time army organization should be the same as its war-time organization. Can anything be more fatuous than deliberately to invite the evils which have been shown to result from such a course: an absence of knowledge by the General Staff of the art of transportation in all its branches in all possible fields of conflict; unpreparedness in the planning and execution of transportation projects adapted to military needs under novel conditions; friction incident to the straying of one department into the field of another, and to the injection of the civilian into military life without first removing grounds for jealousy; misconception of the nature of military transportation as indicated in the post-war supply diagrams issued by the War Department, and interferences by purely military officers with the technical duties of transportation."

While suggesting here no detailed plans for re-organization, Col. Wilgus declared that any satisfactory set-up must involve "a single-headed management by an officer of tact and initiative, trained in civil life in the art of transportation in its broadest sense and acquainted in some degree with the military art, reporting direct to the one to whom in the last analysis he is to be held responsible for results, and backed by nuclei of men experienced in their respective branches of transportation on land and water and in the air." In this way would the two arts,—the military and the transportation—be brought together "to perform a public service in peace-time and in war."

5 Months N. O. I. Was $45,288,504

(*Continued from page 83*)

for the five months totaled $646,879,125, a decrease of 27.2 per cent compared with 1937, and a decrease of 42.4 per cent compared with 1930. Operating expenses totaled $519,312,459, a decrease of 17.9 per cent below 1937, and a decrease of 39 per cent under 1930. May net in the Eastern district was $11,464,731 compared with $29,857,917 in May, 1937, and $43,275,323 in May, 1930.

The Southern district's net for the five months was $18,573,385, or 1.39 per cent, as compared with $36,075,450 or 2.67 per cent in 1937, and $38,895,434 or 2.76 per cent in 1930. Gross in the Southern district for the five months amounted to $194,857,017, a decrease of 14.3 per cent compared with 1937, and a drop of 33.3 per cent under 1930; operating expenses totaled $151,428,899, a decrease of 8.6 per cent below 1937, and a decrease of 33.9 per cent under 1930. In the Southern district the May net was $3,663,934 compared with $5,603,013 in May, 1937, and $6,010,550 in May 1930.

Class I roads in the Western district for the first five months had an operating deficit of $7,667,249. For the same five months in 1937, the railroads in that district had a net railway operating income of $47,068,160 which was at the annual rate of return of 1.87 per cent, and for the same period in 1930 their net was $85,102,973 or 2.92 per cent on investment. Gross in the Western district for the five months amounted to $512,532,559, a decrease of 17.3 per cent below 1937, and 36.2 per cent under 1930. Operating expenses totaled $443,028,618, a decrease of 10.5 per cent compared with the same period in 1937, and a decrease of 30.5 per cent under the same period in 1930. For May alone, the roads in the Western district reported a net of $1,368,036 compared with $8,778,526 in May, 1937, and $18,504,463 in May, 1930.

"Jim Crow" Case Is Heard by I. C. C.

(*Continued from page 82*)

particular run from Memphis to Hot Springs is of modern construction and is air-conditioned and has separate flush toilets for both men and women. He admitted that the car was divided with the negroes occupying one half and the white passengers the other, but defended this practice on the grounds of economy, saying that the number of coach passengers did not justify the running of separate coaches for both races.

Coming to the legal phases of the case, Mr. Hughes said that he would not discuss the "merits" of the "Jim Crow" laws, but he told the commission that after a careful search of the cases, he had failed to find a single case where such a law had been invalidated by a court of last resort. He then cited several state decisions showing that segregation laws have been held to be police regulations set up to insure the peace and tranquillity of the state and not laws interfering with the orderly flow of interstate commerce. He also said that the railroad felt that it was forced to obey the law and was especially desirous that the commission clarify the situation so that it would know how to proceed in the future.

Appearing as counsel for the complainant, Mr. Mitchell, Richard E. Westbrooks made an eloquent and impassioned plea in which he urged that the commission order the Rock Island to cease and desist from its present practice of discriminating between white and colored passengers in-

sofar as it refuses to provide first class accommodations for negro passengers. It was Mr. Westbrooks' contention that the Arkansas statute does not apply to interstate passengers, and he cited United States Supreme Court cases to buttress his argument. The complainant's counsel told the commission that his client was only asking that the railroad live up to its part of a contractual obligation in which Mr. Mitchell had paid his money for something which he did not receive. He stressed the fact that they were not opposing segregation, but that they were insisting on equal accommodations which the various "Jim Crow" laws require. During the argument there was some indication that the case might be ultimately carried to the Supreme Court of the United States if the commission either dismisses the case or rules against the complainant.

This particular oral argument was unique in that it was the first one to be recorded on a phonographic disc which can be reproduced orally at any time that it is desired. The commission has contracted with the firm which produces this sound recording machine to permit it to record all oral arguments before the commission. The device is now being used by the Federal Communications Commission and has been experimented with in the Federal Courts in Washington, D. C. The machine dispenses with the shorthand reporter, and provides a recorded version of the proceedings from which stenographic records can be typed off. The salient feature of the machine is that it gets all the spoken words and the speed of the speaker has no effect on it. A microphone is placed in front of each of the commissioners and the speaker so that all comments will be included in the record.

I. C. C. Hearing on Express Rates

(*Continued from page 81*)

ments by R. E. A. to the railroads. Mr. Head replied that any wage cut which R. E. A. succeeded in effecting would enable it to make increased payments to the carriers.

Mr. Lutz, who is the R. E. A. vice-president in charge of accounting, preceded Mr. Head, offering a 16-page exhibit setting forth consolidated figures on R. E. A.'s and Southeastern's financial and operating results. This exhibit listed total increases in costs of $10,870,555, including increased wage costs of $7,016,577 as a result of 1937 adjustments. Another tabulation shows that, since 1930, express revenues have fallen to 55.97 per cent of the 1923-1929 average, while payments to railroads have dropped to 35.91 per cent of that average. Meanwhile the comparable index of express operating expenses was 71.96 per cent, while that for express taxes was 319 per cent.

Traffic Vice-President Frey, who was the final R. E. A. witness, explained the proposed adjustment as one which contemplates a 10 per cent increase in the 100-lb. rates if under $9, and a 5 per cent increase if $9 or over. Also, it is proposed to apply the increased rates pro rata for each pound, 1 to 99 lb., plus an arbitrary factor of 10 cents regardless of weight, observing the 100-lb. rate as a maximum, and observing a scale of minima for weights 1 to 11 lb. designed to provide appropriate low-weight charges and to avoid any substantial encroachment on the parcel post traffic, the average weight of which at present is 5 lb. per shipment and the average charge around 19 cents per shipment. Express carload rates on berries, fruits, melons and vegetables would be increased 5 per cent, while all other express carload rates would be boosted 10 per cent. Revenue from express carload traffic "is less than 4 per cent of all express revenues."

In the latter connection Mr. Frey had previously explained that the express companies are primarily carriers of small packages; and he went on to point out how the present express-rate formula, with its 35-cent fixed express terminal factor, results in proportionately high charges, especially in the lower brackets—a condition that "probably should have been corrected many years ago." The proposed scale carries an arbitrary of only 10 cents, as noted above.

Mr. Frey explained that among other things the high fixed factor "has produced and built up in New York City a number of consolidators of express shipments . . . who, for fees ranging from 5 cents to 10 cents per package, solicit consignees in cities and towns throughout the United States to require shippers to send their express packages through such consolidators at the 100-lb. express rate. . . ." R. E. A. tried to correct this situation in 1932 by the publication of a destination aggregating rule, but the commission refused to permit the rule to become effective. Conditions have grown worse in recent years, Mr. Frey said, "and shippers rightly feel that the Express Agency has failed to render a complete transportation service because a third party has been permitted to utilize its facilities at a profit. They feel also that such transportation economies as are effected by use of the forwarder can and should be achieved by the Express Agency, and that any monetary advantage therefrom should accrue to the shipper and the transportation company."

As was pointed out in the application, Mr. Frey said that R. E. A. has estimated that if the proposed adjustment had been in effect in 1937 it would have produced $5,000,000 additional revenue, while another $5,000,000 would have come from traffic attracted by the proposed "modernization of the package rate structure."

Cross-examination of the R. E. A. witnesses was deferred until a later hearing. At the close of the July 6 session Commissioner Aitchison held an informal conference on the demand for hearings outside Washington. Indications were that the demand would be sufficient to warrant scheduling hearings at New York, Chicago, San Francisco, Calif., Atlanta, Ga., and perhaps Boston, Mass., Kansas City, Mo., and some point in inter-mountain territory.

Supply Trade

The Clapp Machinery Company, New York, has been appointed distributor for county and township sales in the central portion of New York by the Bucyrus-Erie Company, South Milwaukee, Wis.

The Edward O'Malley Valve Co., Blue Island, Ill., has purchased the Central Valve Mfg. Co., successor to the O'Malley-Beare Valve Company, and moved its offices to the Central's plant at 231 East Ninety-fifth street Chicago. Officers of the new company are: president, **Edward O'Malley, Sr.**; vice-president, **Edward O'Malley, Jr.**; secretary, **J. G. McNeil**; and general manager, **S. C. Boston.**

W. J. Mayer, has joined the staff of the **A. M. Byers Company,** Pittsburgh, Pa., as a sales engineer. He will work out of the company's Philadelphia division office, and his territory will include Baltimore, Md., and the south. He will be associated with **E. L. MacWhorter,** division manager at Philadelphia. Mr. Mayer previously served as commercial research engineer for the Reading Iron Company.

The National Labor Relations Board announced on June 25 that an election would be held within 15 days among employees of the **Pressed Steel Car Company, Inc.,** McKees Rocks, Pa., to determine whether they desire to be represented by Car and Foundry Workers Union, Inc., by Steel Workers Organizing Committee in behalf of the Amalgamated Association of Iron, Steel and Tin Workers of North America, Lodge No. 1844, (C. I. O.), or by neither. The company, the announcement says, normally employs about 1300 workers.

OBITUARY

George E. Emmons, formerly manager of the Schenectady Works of the General Electric Company and later vice-president in charge of manufacturing for the company, who retired in 1924, died in Pasadena, Cal., at the age of 80 years.

TRADE PUBLICATION

COLD-DRAWN STEELS.—The Union Drawn Steel division of the Republic Steel Corporation, Cleveland, Ohio has just issued a 24-page illustrated handbook entitled, "Cutting Costs with Cold-Drawn Steels." This is a non-technical discussion of the results of cold drawing and the best methods of utilizing the improved physical properties of the steels. This handbook is said to be the first published work outlining the full story of the advantages of cold-drawn steels and showing how these steels can be used in reducing the cost of manufacturing machined and structural parts. The book is also designed to serve as a guide in the selection of materials for such applications.

Equipment and Supplies

Equipment Orders First Half 1938

Orders for 75 locos., 8,024 freight and 107 passenger cars in six months' period

Domestic equipment orders for 31 locomotives, and 1,091 freight cars were placed during June; no passenger-train equipment was purchased. Equipment orders for the first six months of the year are thereby brought to a total of 75 locomotives, 8,024 freight cars and 107 passenger cars, as compared with 228 locomotives, 45,090 freight cars and 456 passenger-train cars during the corresponding half of 1937.

Foreign roads ordered 2 locomotives during the month. Export orders for first six months of the year total 9 locomotives and 292 freight cars, as compared with 41 locomotives, and 1,050 freight cars in the corresponding period of 1937. As of the end of June, Canadian builders had received orders for a total of 35 locomotives, 4,829 freight cars and 19 passenger-train cars for the year thus far, as compared with orders for 50 locomotives, 7,358 freight cars and 90 passenger-train cars during the first half of 1937.

Domestic roads ordered 6,620 tons of rail during June, thereby bringing the total for the first half of the year to 188,252 tons, as compared with 65,017 tons ordered during the first six months of 1937.

Domestic Equipment Orders Reported in Issues of The Railway Age in June, 1938

(Incl. July 2)

LOCOMOTIVES

Date	Name of Company	No.	Type	Builder
June 11	Pennsylvania	20	Electric	Company Shops
June 18	Baltimore & Ohio	2	Diesel-electric	Electro-Motive Corp.
June 25	Seaboard Air Line	9	Diesel-electric	Electro-Motive Corp.

FREIGHT CARS

June 11	Pennsylvania	1,000	Gondola	Company Shops
		6	Well	Company Shops
		2	Flat	Company Shops
June 25	U. S. Sugar Corp.	20	Cane	Magor Car
June 25	U. S. Navy Dept.	3	Flat	Haffner-Thrall
		1	Box	American Car & Foundry
		2	Tank	American Car & Foundry
July 2	Bethlehem Mines Corp.	7	Air-dump	Austin-Western
July 2	Lehigh & New England	50	Covered Hopper	American Car & Foundry

IRON AND STEEL

THE CHICAGO & NORTH WESTERN is inquiring for 680 tons of structural steel for track elevation work at Kenosha, Wis.

THE SOUTHERN PACIFIC is inquiring for 102 tons of structural steel for a bridge over the Humbolt river in Nevada.

THE BOARD OF TRANSPORTATION, CITY OF NEW YORK, has awarded a contract for 500 tons of 100-lb. rail to the Bethlehem Steel Company for use in the city-owned subway.

Construction

CHICAGO, BURLINGTON & QUINCY. — A contract has been awarded to Johnson and Kramer, general contractors, Winona, Minn., for the erection of a warehouse consisting of one story and basement 107 ft. by 88 ft., at Lafayette and Second streets, Winona. The structure will be of steel and brick with a concrete foundation and will be leased to Gamble-Robinson Co., except a portion which will be used for Burlington baggage room, waiting room and offices, and also offices for the Green Bay & Western. The total cost of the new warehouse will be approximately $60,000.

BALTIMORE & OHIO. — A contract has been given to the Bates & Rogers Construction Corp., Chicago, for repairs to retaining wall at Cincinnati, Ohio.

THE UNITED ELECTRIC COAL COMPANY. —The United Electric Coal Company has started the construction of a 7½-mile railroad extending from its Buckheart mine at Dumfermline, Ill., near Canton, to a point on the Illinois river three miles north of Liverpool. The line will be standard gage and its equipment will consist of 40 dump cars and 2 steam locomotives. At the river point, a modern dock will be constructed for loading coal into barges. It is estimated the cost of the railroad and the river loading facilities will be about $300,000.

WABASH.—A contract has been given to the Bates & Rogers Construction Corp., Chicago, for repairs to piers and abutments in Illinois, to cost between $50,000 and $75,000.

Financial

ATCHISON, TOPEKA & SANTA FE.—*Abandonment.*—Examiner W. J. Schutrumpf of the Interstate Commerce Commission, in a proposed report to the commission, has recommended that it authorize this company to abandon the line and the Gulf, Colorado & Santa Fe to abandon the operation of the line extending from Davis, Okla., to Sulphur, 9 miles.

BALTIMORE & OHIO.—*Trackage Rights.* —This company has asked the Interstate Commerce Commission for authority to reacquire trackage rights over the line of the Pittsburgh & Lake Erie between McKeesport, Pa., and New Castle Junction, 58.1 miles.

BALTIMORE & OHIO.—*R. F. C. Loan Application.*—This company has applied to the Reconstruction Finance Corporation for a loan of $6,000,000, maturing on September 1, 1942, the proceeds to be used for maintenance and purchase of supplies. The company requests that $3,000,000 be advanced on July 15 and $3,000,000 on August 15.

BOSTON & MAINE. — *Abandonment.* — This company has asked the Interstate Commerce Commission for authority to abandon one mile of line in Clinton, Mass.

ERIE.—*Payments.*—Trustees of the Erie have asked the district court at Cleveland for authority to pay $223,000 of equipment trusts of 1930 which matured on June 15, 1938, and dividends of $76,262 on trust certificates now outstanding.

ERIE.—*Reorganization.*—The Nypano and the New Jersey & New York have filed petitions for reorganization under Section 77 of the Bankruptcy Act with the United States District Court in Cleveland, Ohio. The roads are subsidiaries of the Erie.

FONDA, JOHNSTOWN & GLOVERSVILLE.—*Hearing Postponed.*—The Interstate Commerce Commission, Division 4, has postponed from July 26, to October 6, the date for public hearing in the case of the reorganization of this company under Section 77 of the Bankruptcy Act.

GOLDSBORO UNION STATION. — *Bonds.*— The Interstate Commerce Commission, Division 4, has authorized this company to extend from August 1, 1933, to August 1, 1948, the maturity date of $96,000 of first mortgage 4½ per cent bonds.

ILLINOIS TERMINAL. — *Abandonment.* — This company has asked the Interstate Commerce Commission for authority to abandon a line from Staunton, Ill., to Litchfield, 15.3 miles.

LEHIGH VALLEY.—*Abandonment.* — The Interstate Commerce Commission, Division 4, has authorized this company to abandon operation and the Lehigh Valley Rail Way to abandon the line from Canastota, N. Y., to Camden, 20.3 miles.

MINNEAPOLIS & ST. LOUIS.—*Lease.*—The Interstate Commerce Commission, Division 4, has approved a lease by the Mound City & Eastern of a line of this company extending from Aberdeen, S. Dak., to Leola, 29.6 miles.

MINNEAPOLIS & ST. LOUIS.—*Abandonment.*—The Interstate Commerce Commission, Division 4, has authorized the receivers to abandon that part of a branch line extending from St. Benedict, Iowa, to Algona, 8.5 miles. The commission had, on February 21, 1936, authorized the receivers to abandon the operation of this line.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—*Abandonment.*—Examiner J. S. Prichard of the Interstate Commerce Commission, in a proposed report to the commission, has recommended that it authorize the trustees to abandon operation and the receiver of the Wisconsin Central to abandon a branch line extending easterly from Owen, Wis., to Curtiss, 6.8 miles.

NEW YORK CENTRAL.—*Abandonment.*—Examiner J. S. Prichard, of the Interstate Commerce Commission, in a proposed report to the commission, has recommended that it refuse to authorize this company to abandon a line extending from Suspension Bridge, N. Y., to Lewiston, 5.3 miles. The examiner found that the line had sufficient traffic to justify the continued operation.

PENNSYLVANIA.—*Equipment Trust Certificates.*—This company has awarded an issue of $6,330,000 of 2¾ equipment trust certificates to Gregory & Son, Inc., New York, at a price of 100.375 which will make the annual cost to the railroad approximately 2.696 per cent.

PUTNAM COUNTY.—*Acquisition and Operation.*—The Interstate Commerce Commission, Division 4, has denied the application of this company to acquire and operate in interstate and foreign commerce a mine track extending from Granville, Ill., to Mark, 1.8 miles.

SIERRA.—*Abandonment.*—This company has asked the Interstate Commerce Commission for authority to abandon operation under trackage rights over the Hetch Hetchy from Hetch Hetchy Junction, Calif., to Mather, 59 miles.

SOUTHERN. — *Abandonment.* — This company has asked the Interstate Commerce Commission for authority to abandon a line extending from Hodges, S. C., to Abbeville, 11.6 miles.

WABASH.—*Reorganization.*—The Interstate Commerce Commission, Division 4, has set September 7 as the date for public hearing in the case of the reorganization of this company under Section 77 of the Bankruptcy Act.

Average Prices of Stocks and Bonds

	July 5	Last week	Last year
Average price of 20 representative railway stocks..	27.23	25.19	52.37
Average price of 20 representative railway bonds..	58.86	56.33	79.81

Railway Officers

EXECUTIVE

E. A. Whitman, vice-president and general manager of the Minneapolis, St. Paul & Sault Ste. Marie has been appointed to the newly-created position of chief operating officer, and **R. Simpson,** assistant to vice-president and general manager, has been appointed to the newly-created position of assistant to chief operating officer.

James Davies, vice-president of the Alton & Southern, has been elected president, succeeding **Thomas H. Pindell,** who was elected chairman of the board, and **Raymond Durley,** general manager, was elected vice-president in charge of maintenance and operation.

FINANCIAL, LEGAL AND ACCOUNTING

John C. Lockwood has been appointed district claim agent of the New York Central, with headquarters at New York, succeeding **Erwin T. Jones,** deceased.

R. M. Hunter, auditor of overcharge claims of the Chesapeake & Ohio, with headquarters at Richmond, Va., has been appointed assistant to comptroller, with the same headquarters, succeeding **F. D. Hodgson,** retired. **L. M. Morris** has been appointed assistant auditor of revenues, at Richmond, succeeding **T. E. Jenks,** who has been appointed auditor of revenues, to succeed **C. F. Taylor,** retired. The jurisdiction of **H. L. Hazlewood,** auditor of disbursements, has been extended over the office of the auditor of capital expenditures, succeeding **A. L. Mattern,** retired. **J. F. Andrews,** assistant auditor of station accounts, has been appointed auditor of station accounts and overcharge claims, at Richmond, and all correspondence pertaining to station accounting, overcharge claims and revision matters should be addressed to him. Mr. Andrews succeeds **L. H. Moseman,** auditor of station accounts, who has retired, and Mr. Hunter, whose promotion is noted above.

OPERATING

Lawrence C. Brown, terminal trainmaster of the Atchison, Topeka & Santa Fe at Corwith, Ill., retired on June 1.

Jose Dias Leal was appointed superintendent of the Gulf division of the National Railways of Mexico, with headquarters at Monterrey, N. L., Mex.

T. J. Reid, yardmaster of the East St. Louis terminal of the Illinois Central at East St. Louis, Ill., has been promoted to trainmaster in charge of suburban service of the Illinois Central, with headquarters at the Randolph street station, Chicago, succeeding **John P. Kenney,** whose death on June 14 was announced in the *Railway Age* of June 18.

J. A. Greig, road foreman of engines on the Missouri Pacific, with headquarters at Poplar Bluff, Mo., has been promoted to trainmaster of all districts of the Missouri division, with the same headquarters, succeeding **S. E. Riddon,** who retired on July 1.

Clarence R. Tucker, trainmaster on the Atchison, Topeka & Santa Fe, with headquarters at Brownwood, Tex., has been promoted to superintendent of the Southern division, with headquarters at Temple, Tex., succeeding **F. H. Christian,** whose death on June 2 was reported in the *Railway Age* of June 11.

TRAFFIC

Karl H. Suder, general coal agent and purchasing agent of the Akron, Canton & Youngstown and the Northern Ohio, has been promoted to the newly created position of freight traffic manager.

H. W. Cook, traveling freight agent for the Wabash, with headquarters at Dallas, Tex., has been promoted to general agent at Dallas, succeeding **C. M. Brown,** who is being relieved from active duty pending his retirement January 1, 1939.

E. L. Tomlinson, traveling passenger agent of the Central of New Jersey, with headquarters at Scranton, Pa., has been appointed district passenger agent in the office of the general eastern passenger agent at New York.

J. A. McCaul, general agent of the Texas & Pacific, at Fort Worth, Tex., has been promoted to general manager of the terminal warehouse of the Texas & Pacific at that point, succeeding **L. C. Porter,** whose promotion to assistant to the president is noted elsewhere in these columns. **Frank Wilson,** general agent at Texarkana, Ark., has been transferred to Fort Worth, replacing Mr. McCaul, and **S. L. Wright** is appointed general agent at Texarkana.

Kenner S. Boreman, general agent of the New York, Chicago & St. Louis at Kansas City, Mo., has been promoted to the newly created position of assistant general freight agent, with headquarters at Cleveland, Ohio, and **A. E. Herrmann,** general agent at Louisville, Ky., has been appointed general agent at Kansas City, succeeding Mr. Boreman. **A. J. Stacy,** general agent at Davenport, Iowa, has been transferred to Louisville replacing Mr. Herrmann, and **J. K. Leigh,** commercial agent at Minneapolis, Minn., has been promoted to general agent at Louisville, Ky., relieving Mr. Stacy. **F. C. Mosely,** perishable agent, with headquarters at Harlingen, Tex., has been promoted to general agent at Dallas, Tex., succeeding **L. B. Gerner,** who retired July 1.

R. O. Hambly, whose promotion to traffic manager of the Duluth, South Shore & Atlantic was announced in the *Railway Age* of July 2, was born at Houghton, Mich., on December 16, 1878, and first entered railroad service on July 1, 1894, in the freight traffic department of the Northern Pacific, in which he served in

various clerical capacities. In September, 1902, he was promoted to chief clerk in the general agent's office at Duluth, Minn., and on August 1, 1904, he left the North-

R. O. Hambly

ern Pacific to become rate clerk in the traffic department at Duluth of the Duluth, South Shore & Atlantic. In 1912, Mr. Hambly was promoted to chief clerk of the traffic department, and in 1916 he was advanced to assistant general freight agent. In 1922 he was promoted to general freight agent, and in 1932 he was appointed assistant general freight agent with headquarters at Marquette, Mich., the position he held at the time of his recent promotion.

MECHANICAL

J. B. Dunlop has been appointed superintendent car shop, Canadian National, with headquarters at Leaside, Ont., succeeding **F. G Foster,** who has resigned to become superintendent of motive power and car equipment of the Temiskaming & Northern Ontario.

Frank G. Foster, superintendent of shops, Canadian National, with headquarters at Leaside, Ont., has been appointed superintendent of motive power and car equipment of the Temiskaming & Northern Ontario, at North Bay, Ont., succeeding **Thomas R. Ross,** master mechanic, who has been retired from active service after 33 years with the road. **Charles Battley,** air brake inspector at North Bay and **William M. MacMillan,** car foreman at North Bay, have also been retired.

ENGINEERING AND SIGNALING

John P. Ensign has been appointed assistant engineer of track, New York Central, with headquarters at New York. **F. G. Smith** has been appointed division engineer of the Pennsylvania division, with headquarters at Jersey Shore, Pa.

L. J. Turner, rail inspector of the Chicago, Rock Island & Pacific, with headquarters at Chicago, has been promoted to the newly-created position of supervisor of work equipment with the same headquarters, and with jurisdiction, in addition to his former duties, over all roadway equipment and machines of the maintenance of way department.

Guy H. Watson, assistant to engineer maintenance of way, Boston & Maine, has been promoted to engineer of track, with headquarters at Boston, Mass., succeeding **George K. Thornton,** who has voluntarily retired from active duty after more than 51 years of service with the lines now comprising the Boston & Maine.

E. Carrion, division engineer of the National Railways of Mexico at Acambaro, Gto., Mex., has been transferred to the Queretaro division, with headquarters at Buenavista Station, Mexico, D. F., and **R. Dias Velez,** division engineer of the Gulf division, with headquarters at Monterrey, N. L., Mex., has been transferred to the Pacific division, succeeding Mr. Carrion. **J. G. Jauregui,** division engineer at Mexico, D. F., has been transferred to the Gulf division replacing Mr. Velez at Monterrey, and **Vicente Espinosa Palomino** has been appointed division engineer of the Eastern division, with headquarters at Tierra Blanca, Vera Cruz. The above appointments were effective May 16.

T. A. Blair, district engineer of the Western lines of the Atchison, Topeka & Santa Fe at La Junta, Colo., has been promoted to chief engineer of the Western lines, with headquarters at Amarillo, Tex., to succeed **Warren W. Kelly,** whose promotion to general purchasing agent of the Santa Fe system was announced in the *Railway Age* of July 2, and **Leon V. Lienhard,** division engineer at Arkansas City, Kan., has been promoted to district engineer of the Western lines, with headquarters at La Junta, Colo., succeeding Mr. Blair. Mr. Blair was born at De Beque, Colo., on June 1, 1892, and graduated from the University of Colorado. He entered railway service in 1915 as a rodman on the Santa Fe at Pueblo, Colo., and in 1916 he was promoted to office engineer, with headquarters at Shattuck, Okla. During the war he served with the U. S. army, but returned to the Santa Fe in 1920 as

T. A. Blair

a building inspector on the Plains division. He was later appointed roadmaster, with headquarters at Pueblo, Colo., and in 1926 he was promoted to assistant engineer of the Plains division. Mr. Blair was advanced to division engineer of the Slaton division of the Panhandle & Santa Fe in 1927, with headquarters at Slaton, Tex., and in 1929 he was transferred to the construction department working on the Orient extension, subsequently being appointed division engineer at Pueblo. In the summer of 1936, he was promoted to trainmaster, serving in that capacity at Slaton, and later at Wellington, Kan., and on August 1, 1937, he was advanced to district engineer at La Junta, the position he held at the time of his recent promotion.

Mr. Lienhard was born at Cuero, Tex., on September 26, 1891, and graduated from Texas A. & M. College. He entered railway service in 1913 as a draftsman for the Santa Fe at Amarillo, Tex. He subsequently served in various capacities in the engineering department, and in September, 1926, he was appointed acting roadmaster of the First and Canon City districts of the Colorado division, with headquarters at Pueblo, Colo., later being promoted to roadmaster. In 1929 he was promoted to division engineer, with headquarters at Slaton, Tex., and in 1931 he was

Leon V. Lienhard

appointed roadmaster, with headquarters at Pueblo. In July, 1937, he was promoted to acting division engineer at Dodge City, Kan., and later was promoted to division engineer at Arkansas City, Kan., the position he held at the time of his recent promotion.

F. E. Bates, bridge engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to chief engineer, a position which has been vacant since the death of **E. A. Hadley** on November 11, 1932. **A. A. Miller,** engineer maintenance of way and structures, is appointed chief engineer of maintenance of way and structures, a newly-created position, and the position of engineer of maintenance of way and structures is abolished.

Mr. Miller was born at Zanesville, Ohio, on September 28, 1879, and graduated from the Ohio State University in 1902. He entered railway service in June, 1902, as a rodman on the Baltimore & Ohio, with headquarters at Wheeling, W. Va., and served that road subsequently as a transitman, assistant engineer, and division engineer at Philadelphia, Pa. From September, 1907, to June, 1909, he was engaged as chief engineer for the West Coast Com-

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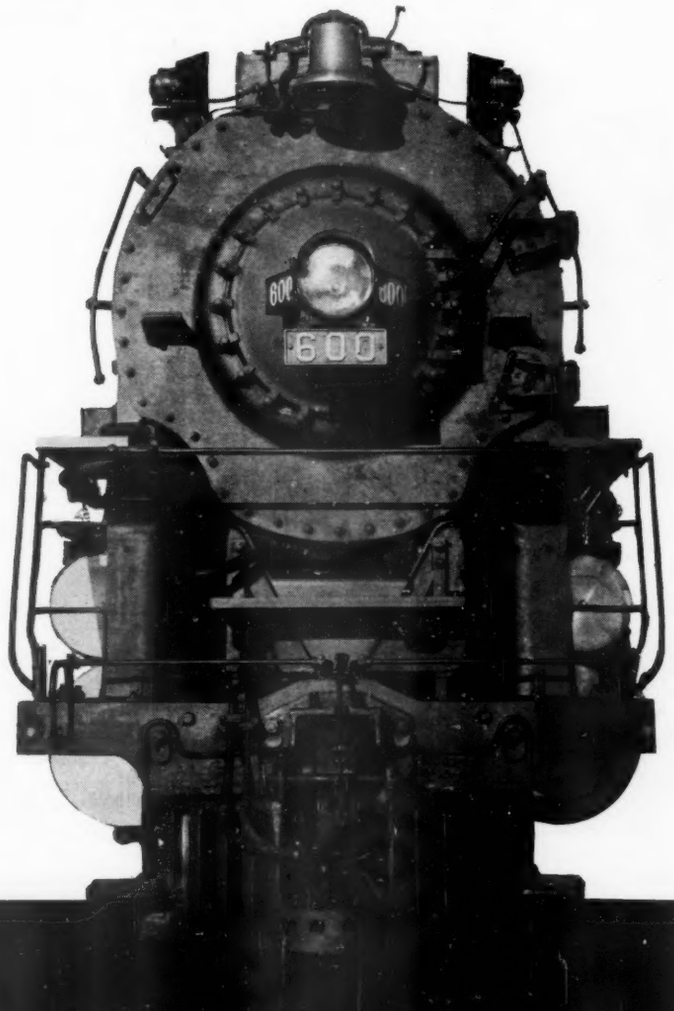
MODERN POWER
Is the Key to Net Profits



Higher mathematics are not needed to determine the advantages of modern power. » » » Modern power uses less coal per 1,000 ton-miles, it moves more tons per train and it moves capacity trains at faster average speeds between terminals. » » » It makes greater use of every railroad facility. It gets its train over the road so the following train can use the rails. » » » It is more economical to operate and costs less to maintain. » » » Modern power, in every case, shows increased net earnings and yields a handsome return on the investment.

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pany at Los Angeles, Cal., and in June, 1909, he entered the service of the Missouri Pacific as an assistant engineer. In June, 1911, he was promoted to division engineer and in January, 1918, he was promoted to

A. A. Miller

district engineer. Mr. Miller was promoted to division superintendent in May, 1921, and in April, 1925, he was advanced to engineer maintenance of way and structures, with headquarters at St. Louis, the position he held at the time of his recent promotion.

PURCHASES AND STORES

H. C. Ralls, district storekeeper of the Missouri Pacific at North Little Rock, Ark., has been promoted to material supervisor, with headquarters at St. Louis, Mo., succeeding **W. I. Dixon,** whose death on March 26 was reported in the *Railway Age* of April 23.

J. F. Clements, assistant purchasing agent of the Akron, Canton & Youngstown and the Northern Ohio, has been promoted to purchasing agent, succeeding **Karl H. Suder,** whose promotion to freight traffic manager is announced elsewhere in these columns. The positions of assistant purchasing agent and of general coal agent have been abolished.

SPECIAL

Dr. C. A. Walker has been appointed chief surgeon and manager of hospital department of the Southern Pacific with headquarters at San Francisco, Cal., succeeding **Dr. W. B. Coffey,** who retired on July 1.

OBITUARY

Martin J. Flanagan, retired trainmaster of the Illinois Central at Freeport, Ill., died at that point on July 3.

Morris R. Leahy, who was general passenger agent of the Chicago & North Western until his retirement on August 1, 1936, died on June 1, after a long illness. Mr. Leahy began railway service with the North Western in 1885 at the age of 16 as a telegraph operator in Milwaukee, Wis., and became assistant general passenger agent in 1914. In 1923 he was promoted to general passenger agent, which position he held until his retirement in 1936.

Charles Peterson, master mechanic of the Denver & Salt Lake, with headquarters at Denver, Colo., died on June 29, following an operation.

Frank D. Sanborn, who retired in October, 1937, as auditor of freight accounts of the Southern Pacific, with headquarters at San Francisco, Cal., died at that point on June 19.

James H. Mulchay, who was assistant to the general freight traffic manager on the Southern Pacific, with headquarters at San Francisco, Cal., at the time of his retirement in 1933, died suddenly of a heart attack at Portland, Ore., on June 19. Mr. Mulchay before his retirement had occupied major traffic executive positions on the Southern Pacific since 1912 when he was appointed assistant general freight agent at Portland. Subsequently he served as general freight agent, assistant freight traffic manager and freight traffic manager of the Northern district, with headquarters at Portland. Mr. Mulchay was later appointed assistant to the general freight traffic manager, with headquarters at San Francisco, the position he held at the time of his retirement in 1933.

Herbert S. Clarke, engineer maintenance of way of the Delaware & Hudson, with headquarters at Albany, N. Y., whose death on June 25 was noted in the *Railway Age* of July 2, was born at Portsmouth, Ontario, Canada, on September 22, 1887, and was educated at the University of Toronto. During 1905 Mr. Clarke served as transitman, Canadian Government well and canal survey; in 1906-1907 he was on the engineering staff of the city of To-

Herbert S. Clarke

ronto and from 1908 to 1910 he was concerned with land and mine surveying at Cobalt, Ont. From 1913 to 1919 Mr. Clarke was location and division engineer for the Canadian Northern and from 1919 to 1921, was division engineer of the Delaware & Hudson at Carbondale, Pa. He was appointed engineer maintenance of way of the Delaware & Hudson in 1921, with headquarters at Albany, the position he held until his death.

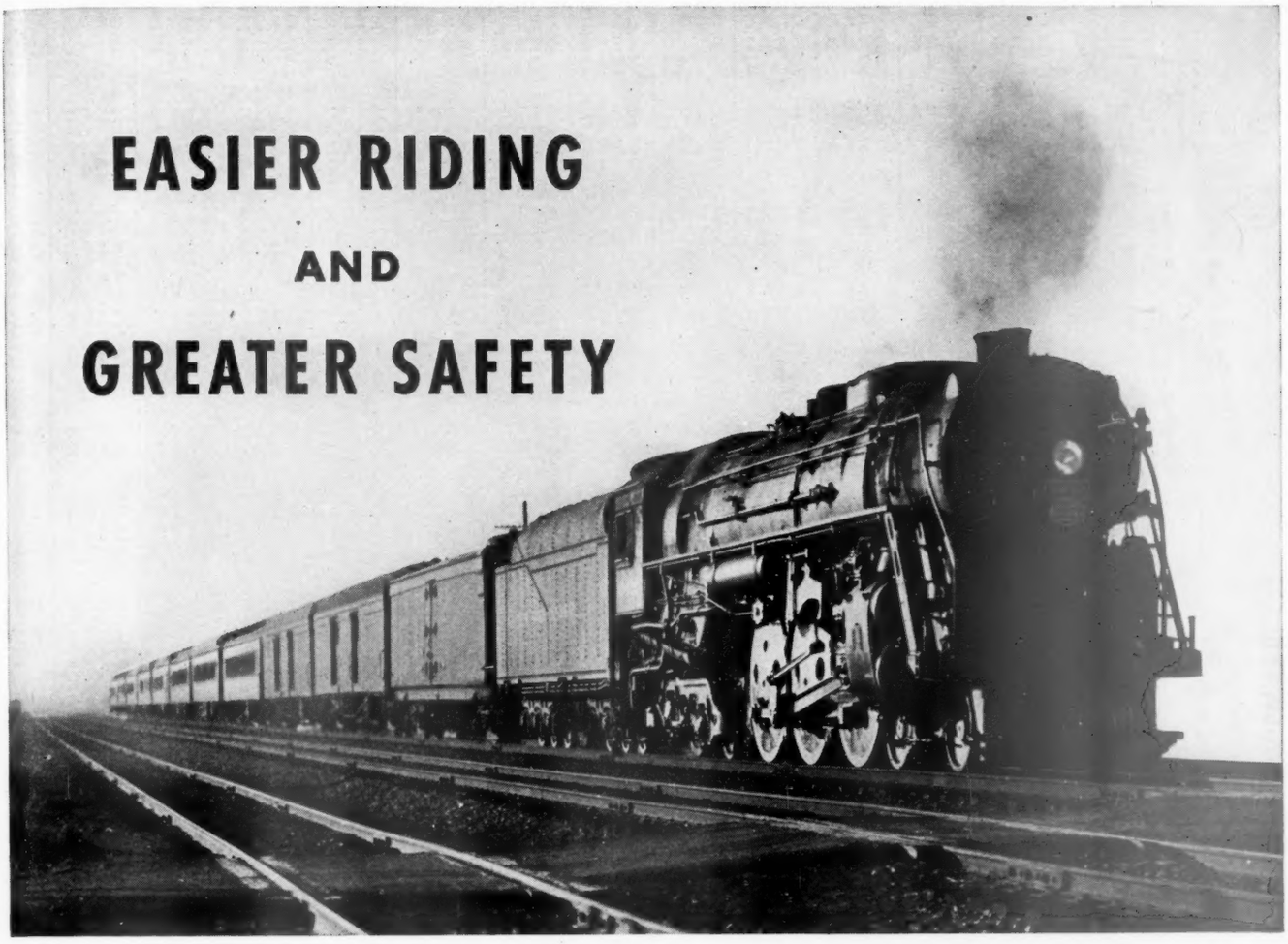
George R. Martin, who was vice-president, executive department, of the Great Northern until his retirement on June 1, 1933, died at Minneapolis, Minn., on June 20. Mr. Martin was born at Evans Mills, N. Y., on July 3, 1864, and attended the United States Military Academy at West Point, N. Y., and later the University of Minnesota. He first entered railway service as an agent-operator on the Chicago & North Western in 1885, and in 1887 went with the Minneapolis, St. Paul & Sault Ste.

George R. Martin

Marie as a station agent, later serving as a train dispatcher and chief clerk to the superintendent. In 1890 he entered the accounting department of the Great Northern, and in 1894 he was promoted to assistant auditor of disbursements. Mr. Martin then served subsequently as special superintendent, general superintendent of the Montana Central (subsidiary of the Great Northern), general superintendent of the Great Northern and auditor of disbursements. He was advanced to general auditor in 1902, to assistant to the comptroller in 1905, assistant comptroller in 1906, and comptroller in 1911. In 1916 he was made vice-president and comptroller, and in 1920 he was elected vice-president, executive department, holding this position until his retirement.

PLUMBING AND HEATING.—The Crane Company, Chicago, has issued a 32-page, well-illustrated catalog, intended as a ready guide for the installation of plumbing and heating equipment for industrial and commercial buildings. The catalog, 8½ in. by 11 in., and in two colors, first discusses briefly the importance of proper sanitation in industry and the dangers of back siphonage, and then proceeds to cover by illustration and description, the wide range of plumbing and sanitary equipment employed in industrial and commercial buildings, including lavatories, showers, drinking fountains, water closets, urinals, and faucets and accessory fixtures. The catalog also describes and illustrates special equipment available for industrial hospitals; heating equipment such as boilers, radiators, convectors and speed heaters; and building water supply systems and water treating equipment.

Table of Revenues and Expenses begins on next left-hand page



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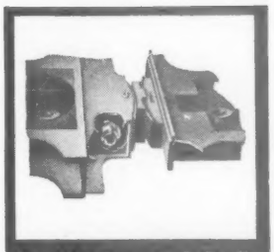
There is much striking proof of the superior riding qualities and lower maintenance resulting from this new Buffer. » » » Slack is eliminated and excessive vibration thereby avoided. Full freedom of movement is provided both laterally and vertically, insuring safety of operation. A high resistance to backward movement effectively dampens vibration. The result —engine and tender become a unit with vastly improved riding qualities, reduced maintenance and greater safety.



Franklin Type E-2 Radial Buffer dampens oscillation between engine and tender and makes for easier riding

Booster Repair Parts made by the jigs and fixtures that produced the original are your best guarantee of satisfactory performance.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1938

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income 1938	Net railway operating income 1937
Akron, Canton & Youngstown	May	171	$118,158	$49	$122,463	$23,162	$11,858	$11,327	$44,549	$100,059	81.7	$22,404	$9,514	—$3,713	$27,601
	5 mos.	171	597,816	189	621,962	111,313	62,637	57,199	246,163	526,575	84.7	95,387	30,418	—41,631	170,775
Alton	May	957	832,770	196,561	1,187,876	166,075	206,239	45,151	515,252	998,364	84.0	189,512	99,337	—76,460	—30,440
	5 mos.	957	4,063,821	1,006,046	5,902,059	737,119	985,248	226,180	2,677,962	4,975,233	84.3	926,826	441,783	—369,680	470,452
Atchison, Topeka & Santa Fe System	May	13,512	9,069,689	1,342,265	11,508,304	1,233,170	2,203,840	432,682	4,604,064	8,844,664	76.9	2,663,640	1,487,235	1,369,326	424,501
	5 mos.	13,512	43,389,352	6,266,390	54,734,068	7,350,767	14,311,731	2,278,925	23,331,375	49,202,466	89.9	5,531,602	—579,690	—1,089,121	5,171,628
Atlanta & West Point	May	93	86,079	20,878	128,004	18,626	27,216	8,183	63,484	127,430	99.6	574	—9,445	—23,862	—4,915
	5 mos.	93	422,377	117,010	647,224	93,368	127,815	40,813	321,262	636,964	98.4	10,260	—39,272	—107,230	—14,137
Western of Alabama	May	133	91,153	21,288	129,997	19,103	28,687	7,973	49,343	113,923	87.6	16,074	2,583	4,688	12,241
	5 mos.	133	447,367	117,786	653,362	95,202	149,419	39,109	267,982	600,766	91.9	52,596	—15,109	—2,649	32,760
Atlanta, Birmingham & Coast	May	639	214,040	5,609	249,950	41,625	51,968	24,694	111,045	257,222	102.9	—7,272	—32,056	—55,862	—10,650
	5 mos.	639	1,124,856	134,705	1,402,481	214,490	250,566	120,690	587,680	1,302,064	92.8	100,417	—24,456	—152,339	45,983
Atlantic Coast Line	May	5,105	2,874,136	455,528	3,729,689	449,808	594,936	142,091	1,530,175	2,878,957	77.2	850,732	400,732	125,250	333,224
	5 mos.	5,105	15,211,559	4,455,393	21,831,839	2,257,823	3,498,671	782,987	8,386,773	15,950,073	73.1	5,881,766	3,306,766	2,169,460	3,777,941
Charleston & Western Carolina	May	343	192,957	1,219	198,551	24,659	31,119	8,338	66,322	137,229	69.1	61,322	44,322	40,994	63,386
	5 mos.	343	905,479	4,908	932,874	130,303	175,841	40,413	345,007	722,048	77.4	210,826	107,826	87,299	251,723
Baltimore & Ohio	May	6,434	8,620,583	929,236	10,254,152	800,733	2,210,296	375,106	4,231,551	8,146,503	79.5	2,107,649	1,221,944	841,236	2,255,521
	5 mos.	6,443	43,033,827	4,236,957	50,810,255	4,865,762	11,923,541	1,865,520	22,006,657	43,378,969	85.4	7,431,286	2,914,084	1,132,983	11,744,242
Staten Island Rapid Transit	May	24	48,960	67,554	127,204	11,595	18,244	1,011	79,878	121,034	95.1	6,170	—22,152	—27,627	—25,341
	5 mos.	24	246,752	318,494	609,160	46,290	97,975	5,922	408,462	612,385	100.5	—3,225	—145,270	—171,767	—144,755
Bangor & Aroostook	May	603	541,112	10,917	568,760	116,207	83,929	5,792	127,416	361,071	63.5	207,689	127,393	136,652	220,335
	5 mos.	603	3,161,833	91,348	3,340,436	536,330	451,057	28,344	785,891	1,935,229	57.9	1,405,207	1,043,835	967,090	1,113,439
Bessemer & Lake Erie	May	225	534,979	499	544,855	116,877	170,793	11,848	136,145	466,318	85.6	78,537	44,719	51,142	1,060,105
	5 mos.	225	1,782,334	3,270	1,833,102	288,701	990,928	60,408	646,866	2,146,481	117.1	—313,379	—519,070	—435,535	2,225,785
Boston & Maine	May	1,960	2,354,176	518,044	3,294,968	450,933	523,696	60,259	1,402,387	2,594,144	78.8	700,824	372,079	190,345	494,634
	5 mos.	1,960	11,095,084	2,776,910	16,078,139	2,304,339	2,588,214	320,832	7,317,820	13,333,137	83.0	2,745,002	1,173,243	194,576	3,270,744
Burlington, Rock Island	May	255	88,217	17,592	112,850	24,083	27,044	4,698	51,603	116,875	103.6	—4,025	—11,414	—21,043	—6,320
	5 mos.	255	429,372	88,351	554,436	104,127	103,682	24,828	265,144	546,329	98.5	8,107	—29,152	—82,645	—41,164
Cambria & Indiana	May	37	69,860	.....	69,965	17,229	43,998	404	7,909	75,381	107.74	—5,416	—16,940	25,968	68,238
	5 mos.	37	466,225	.....	466,721	46,720	229,771	2,068	48,938	358,848	76.89	107,873	8,666	300,196	418,705
Canadian Pacific Lines in Maine	May	234	116,249	10,285	138,978	54,442	37,790	10,145	57,704	168,749	121.4	—29,769	—39,940	—60,560	—56,125
	5 mos.	234	1,177,926	63,887	1,302,407	183,328	246,763	49,758	453,074	976,661	75.0	325,746	271,421	151,939	189,416
Canadian Pacific Lines in Vermont	May	91	55,691	6,562	71,418	21,481	24,534	4,546	56,665	112,842	158.0	—41,424	—48,257	—66,926	—31,567
	5 mos.	91	230,087	40,883	323,587	73,567	120,914	21,850	302,871	548,100	169.4	—224,513	—259,711	—354,340	—196,460
Central of Georgia	May	1,926	1,008,288	86,808	1,238,829	166,145	245,570	52,429	556,447	1,096,643	88.5	142,186	30,204	—16,591	115,204
	5 mos.	1,926	4,744,197	554,625	6,102,695	828,468	1,205,953	270,342	2,831,192	5,537,021	90.7	565,674	5,457	—113,809	793,658
Central of New Jersey	May	709	1,904,302	357,733	2,417,519	125,780	393,050	56,588	1,050,127	1,716,868	71.0	700,651	295,456	167,085	286,157
	5 mos.	709	9,269,990	1,711,705	11,771,207	638,982	1,918,475	244,896	5,435,937	8,690,678	73.8	3,080,529	1,112,162	346,901	1,388,457
Central Vermont	May	456	335,878	29,765	404,233	78,029	72,706	13,510	200,940	386,716	95.7	17,517	—9,369	—49,363	91,513
	5 mos.	456	1,574,542	164,134	1,922,924	352,251	338,162	63,680	1,074,660	1,930,134	100.4	—7,210	—138,998	—326,327	220,574
Chesapeake & Ohio	May	3,102	7,343,068	289,163	7,976,394	832,821	1,516,331	203,035	2,147,632	4,998,279	62.7	2,978,115	2,099,918	1,999,579	3,397,424
	5 mos.	3,102	36,129,189	1,251,287	38,763,032	4,608,186	8,267,628	1,010,641	10,926,717	26,324,976	67.9	12,438,056	8,176,003	7,962,067	16,720,301
Chicago & Eastern Illinois	May	927	832,063	103,160	1,064,203	148,613	167,810	56,385	474,002	913,370	85.8	150,833	71,833	—68,118	11,900
	5 mos.	927	4,503,430	582,426	5,762,239	699,013	1,008,004	279,466	2,485,777	4,801,405	83.3	960,834	565,834	—109,194	648,755
Chicago & Illinois Midland	May	131	258,115	1,006	264,972	30,079	56,428	18,100	74,023	194,991	73.6	69,981	48,409	45,239	33,615
	5 mos.	131	1,354,520	4,668	1,391,564	124,953	315,900	96,974	401,018	1,028,870	73.9	362,694	254,232	245,399	407,911
Chicago & North Western	May	8,391	4,539,081	876,453	6,051,070	1,202,444	1,451,651	182,604	2,667,438	5,804,026	95.9	247,044	—354,711	—594,594	—665,613
	5 mos.	8,391	22,129,542	4,162,114	29,586,414	4,522,609	7,826,701	929,199	14,198,452	29,008,013	98.0	578,401	—2,665,387	—3,566,533	—1,735,120
Chicago, Burlington & Quincy	May	8,970	5,088,714	692,204	6,543,445	1,070,419	1,158,441	258,276	2,559,552	5,318,381	81.3	1,225,064	499,645	165,851	—328,529
	5 mos.	8,970	26,163,024	3,312,390	33,360,691	3,913,570	6,560,722	1,236,198	13,651,713	26,833,975	80.4	6,526,716	2,866,251	1,019,415	3,411,609
Chicago Great Western	May	1,505	1,156,936	29,634	1,275,496	193,787	228,927	44,290	530,574	1,047,604	82.1	227,892	150,499	—25,120	8,530
	5 mos.	1,505	5,989,539	185,240	6,628,162	1,054,985	1,203,851	284,041	2,861,242	5,663,253	85.4	964,909	515,326	—379,041	112,530
Chicago, Indianapolis & Louisville	May	549	536,679	46,690	653,959	68,213	123,889	29,127	298,472	559,410	85.5	94,549	54,914	—42,585	—15,544
	5 mos.	549	2,710,855	246,115	3,264,437	333,136	772,972	149,644	1,518,270	2,965,406	90.8	299,031	83,753	—422,484	62,431

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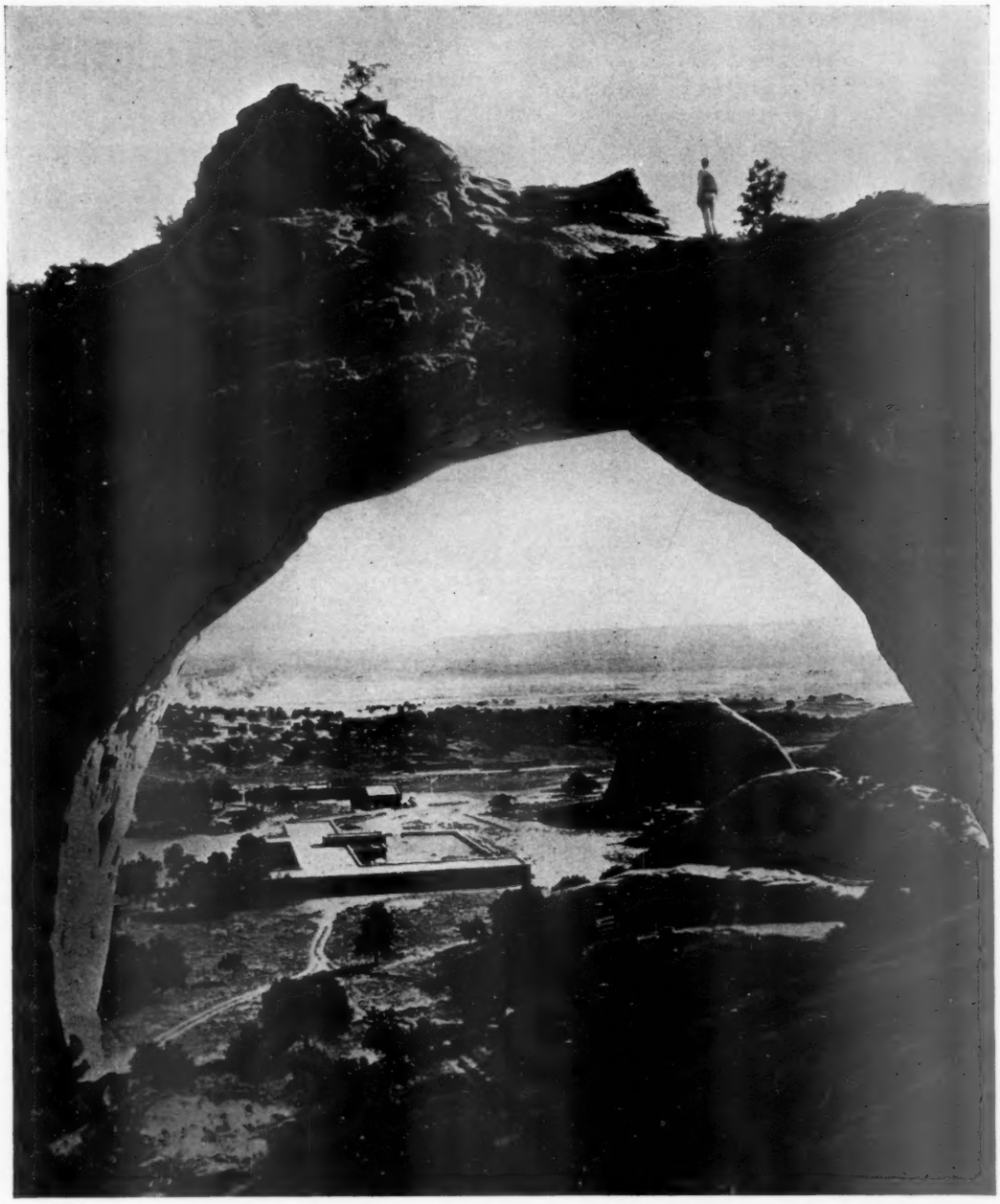
NO. 63 OF A SERIES OF FAMOUS ARCHES OF THE WORLD



WINDOW ROCK, ARIZONA

This natural arch at Window Rock, Arizona, the capital of the Navajo Tribe is a scenic wonder. Its size is indicated by the man standing on top. » » » While the old brick slabs that were supplanted by the modern Sectional Security locomotive arch were not quite so bulky as this, they were equally impractical. American Arch Company brought the locomotive arch to its present high state of development and standardized arch brick shapes and sizes to make storekeeping simpler. For over a quarter of a century it has relieved the railroad man of all concern over arch brick.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED
60 EAST 42nd STREET, NEW YORK, N. Y.
Locomotive Combustion Specialists

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1938—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income 1938	Net railway operating income 1937
Chicago, Milwaukee, St. Paul & Pacific	May	10,952	$6,002,486	$555,511	$7,284,661	$1,150,795	$1,538,939	$225,468	$3,056,518	$6,327,089	86.9	$957,572	$211,572	—$173,210	$21,793
	5 mos.	10,960	30,299,727	2,878,842	36,728,792	4,460,907	7,853,032	1,102,008	15,977,569	31,251,962	85.1	5,476,830	1,837,830	—55,178	2,361,494
Chicago, Rock Island & Pacific	May	7,476	4,504,187	562,122	5,574,465	935,241	1,301,297	233,693	2,434,804	5,194,980	93.2	379,485	—121,126	—411,265	—688,339
	5 mos.	7,492	22,346,320	3,033,655	27,862,490	3,694,464	5,947,322	1,161,462	12,718,943	25,203,038	90.5	2,659,452	179,478	—1,308,011	—670,350
Chicago, Rock Island & Gulf	May	627	256,951	27,589	379,101	91,535	36,472	19,329	137,018	308,294	81.3	70,807	45,372	—32,723	34,510
	5 mos.	627	1,255,969	142,157	1,851,337	276,695	178,775	97,040	709,349	1,388,379	75.0	462,958	338,115	—60,421	93,003
Chicago, St. Paul, Minneapolis & Omaha	May	1,648	1,067,829	109,120	1,267,265	223,310	205,267	36,054	580,569	1,107,317	87.4	159,948	55,261	—42,226	—103,320
	5 mos.	1,648	5,173,657	548,705	6,154,229	630,502	1,128,076	192,445	3,195,380	5,478,864	89.0	675,365	146,213	—351,048	—631,517
Clinchfield Railroad	May	308	425,314	3,775	434,451	45,653	88,871	19,009	94,189	262,645	60.5	171,806	122,233	127,054	261,097
	5 mos.	308	2,349,508	18,209	2,394,991	189,740	533,087	95,326	528,128	1,429,191	59.7	965,800	715,260	772,021	1,443,130
Colorado & Southern	May	797	384,099	30,620	461,163	36,058	103,476	12,360	200,826	378,103	82.0	83,060	6,580	—12,871	32,319
	5 mos.	797	1,978,904	149,344	2,376,431	197,678	605,555	70,230	1,083,090	2,092,507	88.1	283,924	—99,599	195,060	213,216
Fort Worth & Denver City	May	902	388,940	52,869	431,954	46,707	93,869	17,651	182,910	371,316	86.0	60,638	21,185	—23,969	56,177
	5 mos.	902	2,272,445	265,027	2,482,609	254,757	504,110	89,887	921,800	1,938,604	78.1	544,005	347,680	132,726	367,351
Columbus & Greenville	May	168	82,631	6,944	95,770	14,362	11,901	4,373	34,639	74,917	78.2	20,853	13,299	13,453	8,469
	5 mos.	168	417,691	36,186	485,433	85,440	72,282	21,780	187,523	422,378	87.0	63,055	29,087	26,908	46,291
Delaware & Hudson	May	831	1,734,804	66,072	1,878,792	160,467	280,431	46,744	715,782	1,307,266	69.6	571,526	419,787	402,933	347,358
	5 mos.	831	7,682,323	421,922	8,488,180	781,699	1,579,245	222,478	3,723,711	6,853,489	80.7	1,634,691	862,728	828,007	1,876,599
Delaware, Lackawanna & Western	May	986	2,788,053	549,364	3,775,624	378,870	633,607	114,726	1,819,021	3,087,702	81.8	687,922	251,922	220,379	678,811
	5 mos.	986	12,977,251	2,712,557	17,841,181	1,106,640	3,154,716	568,064	9,114,181	14,629,698	82.0	3,211,483	1,065,483	887,643	3,295,313
Denver & Rio Grande Western	May	2,570	1,496,659	88,562	1,687,820	339,944	420,762	65,457	651,090	1,567,247	92.9	120,573	—102,538	—180,939	—382,872
	5 mos.	2,570	7,151,590	498,991	8,109,581	1,069,916	2,460,505	316,342	3,296,175	7,567,448	93.3	542,133	—580,114	—846,994	—581,570
Denver & Salt Lake	May	232	98,371	3,904	110,103	35,877	32,540	2,110	40,256	120,377	109.3	—10,274	—38,626	11,114	54,525
	5 mos.	232	633,091	31,851	709,776	106,328	192,322	12,622	250,727	614,495	86.6	95,281	—47,337	179,140	403,022
Detroit & Mackinac	May	242	56,905	2,172	66,593	13,793	11,661	1,045	24,690	54,222	81.4	12,371	12,418	9,005	5,196
	5 mos.	242	239,727	12,809	281,564	49,611	56,757	5,190	121,905	249,165	88.5	32,399	19,975	2,916	38,117
Detroit & Toledo Shore Line	May	50	134,277	.....	134,688	21,514	19,068	8,989	54,100	110,975	82.4	23,713	8,827	—22,978	59,002
	5 mos.	50	1,040,677	.....	1,043,036	105,997	110,618	46,661	311,327	611,787	58.7	431,249	315,938	119,510	571,278
Detroit, Toledo & Ironton	May	472	344,896	202	364,743	42,333	83,425	11,492	105,907	260,936	71.5	103,807	58,628	57,094	157,997
	5 mos.	472	2,039,284	911	2,116,350	237,663	413,378	56,389	592,462	1,391,739	65.8	724,611	492,709	431,316	1,323,735
Duluth, Missabe & Iron Range	May	540	692,153	1,553	814,898	136,186	183,049	4,557	217,642	573,003	70.3	241,895	138,285	140,732	2,894,822
	5 mos.	540	1,120,429	7,583	1,326,948	576,272	1,095,457	21,853	858,005	2,721,125	205.1	—1,394,177	—1,709,696	—1,710,081	1,654,641
Duluth, Winnipeg & Pacific	May	179	82,740	1,423	86,978	28,609	27,524	2,363	40,632	104,181	119.8	—17,203	—24,731	—35,776	—5,867
	5 mos.	179	451,717	6,140	471,916	109,531	102,804	11,487	229,209	473,451	100.3	—1,535	—41,031	—122,025	16,305
Elgin, Joliet & Eastern	May	435	742,116	.....	847,875	89,089	222,181	14,323	386,894	754,582	89.0	93,293	—2,782	—8,935	336,543
	5 mos.	435	3,877,211	17	4,311,746	500,602	1,090,086	73,479	2,047,583	3,906,609	90.6	405,137	—65,120	—105,161	1,916,090
Erie	May	2,275	4,613,559	385,889	5,401,123	748,279	1,192,737	174,587	2,279,010	4,625,589	85.6	775,534	210,117	—18,778	1,411,663
	5 mos.	2,275	22,457,349	1,956,512	26,446,658	2,715,500	6,064,796	849,036	11,738,005	22,636,592	85.6	3,810,066	1,019,369	—270,628	7,141,826
New Jersey & New York	May	46	15,022	38,507	55,625	6,770	10,974	410	39,574	58,857	105.8	—3,232	—10,454	—22,507	—27,951
	5 mos.	46	69,228	203,252	282,333	24,098	58,852	2,405	216,242	308,284	109.2	—25,951	—62,247	—127,224	—138,057
New York, Susquehanna & Western	May	143	212,672	21,463	243,622	41,288	29,682	3,185	98,496	185,801	76.3	57,821	25,566	—14,830	57,888
	5 mos.	143	1,128,988	111,693	1,297,922	108,441	135,680	16,108	530,253	862,112	66.4	435,810	275,194	74,872	263,911
Florida East Coast	May	685	566,116	114,998	758,229	93,283	136,232	23,291	232,959	539,744	71.2	218,485	139,618	40,165	3,463
	5 mos.	685	3,664,206	1,788,506	5,968,444	427,484	731,858	119,458	1,772,987	3,386,425	56.7	2,582,019	2,167,680	1,756,534	1,338,080
Georgia Railroad	May	329	260,725	11,003	295,067	40,326	48,169	18,767	128,431	249,227	84.5	45,840	30,060	42,145	42,993
	5 mos.	329	1,212,024	54,967	1,381,389	169,370	248,423	93,123	647,406	1,230,161	89.1	151,228	73,116	130,245	311,061
Georgia & Florida	May	408	72,526	1,601	77,793	16,915	16,163	7,930	33,484	79,644	102.4	—1,851	—9,501	—10,983	—13,434
	5 mos.	408	384,697	8,348	410,640	97,283	85,637	41,199	175,722	427,218	104.0	—16,578	—55,238	—63,257	—4,712
Grand Trunk Western	May	1,032	1,116,864	67,451	1,289,906	235,795	273,730	45,982	689,141	1,317,473	102.1	—27,567	—147,251	—207,497	317,095
	5 mos.	1,032	5,934,700	364,125	6,818,075	1,036,880	1,615,276	220,358	3,701,116	6,952,601	102.0	—134,526	—760,695	—1,078,590	1,602,047
Canadian National Lines in New England	May	172	85,228	3,029	96,876	31,442	16,643	2,862	61,518	116,689	120.5	—19,813	—35,119	—61,639	—35,734
	5 mos.	172	447,447	20,872	507,730	132,333	119,764	13,570	306,983	595,492	117.3	—87,762	—164,289	—302,014	—213,144
Great Northern	May	8,072	4,359,552	351,518	5,189,032	594,424	1,084,477	208,814	2,010,571	4,136,725	79.7	1,052,307	345,123	264,490	2,753,689
	5 mos.	8,071	20,218,137	1,610,784	23,983,251	2,671,124	5,322,662	959,689	10,506,701	20,743,967	86.5	3,239,284	—211,373	—867,787	4,934,994

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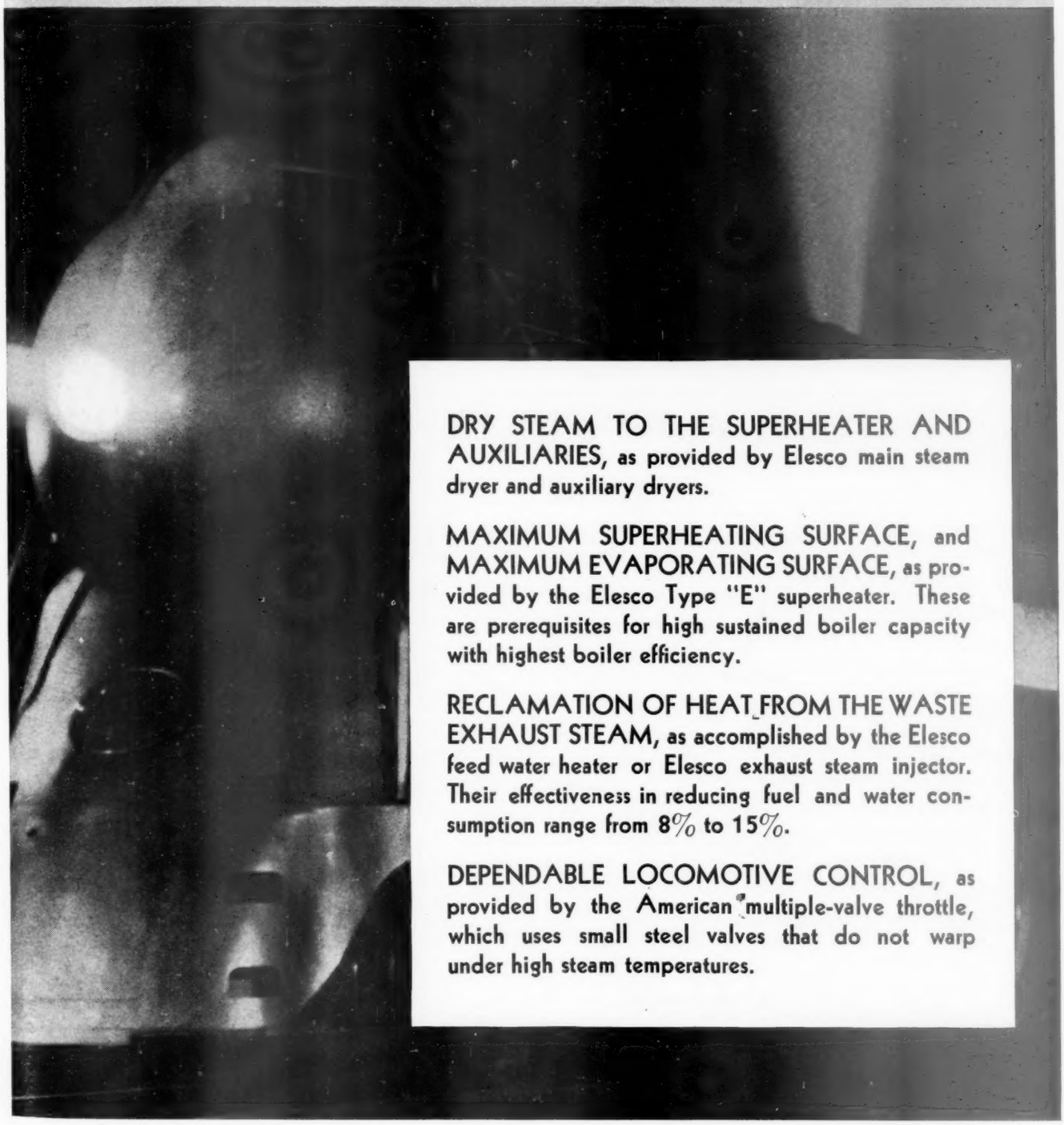
4 Requirements for Efficient Power



DRY STEAM TO THE SUPERHEATER AND AUXILIARIES, as provided by Elesco main steam dryer and auxiliary dryers.

MAXIMUM SUPERHEATING SURFACE, and MAXIMUM EVAPORATING SURFACE, as provided by the Elesco Type "E" superheater. These are prerequisites for high sustained boiler capacity with highest boiler efficiency.

RECLAMATION OF HEAT FROM THE WASTE EXHAUST STEAM, as accomplished by the Elesco feed water heater or Elesco exhaust steam injector. Their effectiveness in reducing fuel and water consumption range from 8% to 15%.

DEPENDABLE LOCOMOTIVE CONTROL, as provided by the American multiple-valve throttle, which uses small steel valves that do not warp under high steam temperatures.

ELESCO

A-1244

THE SUPERHEATER COMPANY

Representative of AMERICAN THROTTLE COMPANY, INC.
60 East 42nd Street, NEW YORK 122 S. Michigan Ave., CHICAGO
Canada: THE SUPERHEATER COMPANY, LTD., MONTREAL

Superheaters « Exhaust Steam Injectors « Feed Water Heaters « American Throttles « Pyrometers « Steam Dryers

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1938—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: 1938	1937
Green Bay & Western	May	234	$116,136	$341	$120,482	$22,113	$16,533	$5,756	$40,861	$89,409	74.2	$31,073	$19,226	$11,400	$10,500
	5 mos.	234	555,423	2,481	579,167	98,358	79,773	31,901	222,318	453,311	78.2	125,856	72,807	42,063	90,540
Gulf & Ship Island	May	259	92,891	6,014	109,356	21,730	14,119	2,526	53,767	97,960	89.6	11,396	—5,873	—15,210	1,675
	5 mos.	259	460,696	35,206	557,939	99,657	75,634	13,664	290,594	506,646	90.8	51,293	—35,422	—86,941	4,326
Gulf, Mobile & Northern	May	936	495,079	19,123	537,058	67,835	78,705	39,657	154,843	375,955	70.0	161,103	112,103	62,129	111,288
	5 mos.	936	2,490,906	107,662	2,724,783	342,710	418,186	200,830	818,643	1,958,016	71.9	766,767	521,767	254,713	571,608
Illinois Central	May	4,952	5,691,000	663,546	7,018,064	736,752	1,421,844	157,080	2,848,099	5,451,547	77.7	1,566,517	927,222	699,085	559,504
	5 mos.	4,952	28,991,671	3,835,480	36,075,521	3,382,590	7,122,443	845,512	14,793,153	27,736,315	76.9	8,339,206	4,989,987	4,225,019	3,730,836
Yazoo & Mississippi Valley	May	1,619	967,435	62,195	1,103,452	98,537	138,450	26,064	445,313	748,389	67.8	355,063	213,450	143,220	148,394
	5 mos.	1,619	4,854,445	327,490	5,571,153	497,642	770,505	140,887	2,346,325	3,985,256	71.5	1,585,897	875,364	502,445	968,622
Illinois Central System	May	6,571	6,658,435	725,741	8,121,516	835,289	1,560,294	183,144	3,293,412	6,199,936	76.3	1,921,580	1,138,608	851,305	717,898
	5 mos.	6,571	33,846,116	4,162,970	41,646,674	3,880,232	7,892,948	986,399	17,139,478	31,721,571	76.2	9,925,103	5,855,034	4,774,064	4,747,758
Illinois Terminal	May	496	333,501	61,966	433,014	52,946	65,709	15,321	158,927	309,817	71.55	123,197	77,945	62,917	62,015
	5 mos.	496	1,600,217	303,316	2,082,271	233,991	333,135	79,764	799,668	1,535,618	73.75	546,653	308,622	235,867	605,710
Kansas City Southern	May	879	973,455	17,781	1,122,467	113,921	149,145	50,117	327,208	702,473	62.6	419,994	317,994	265,064	272,703
	5 mos.	879	4,850,354	85,243	5,528,206	564,577	744,344	252,502	1,663,681	3,544,422	64.1	1,983,784	1,465,784	1,205,457	1,161,146
Kansas, Oklahoma & Gulf	May	327	165,383	420	168,244	22,653	17,153	8,833	42,764	99,299	59.0	68,945	52,315	40,669	53,463
	5 mos.	327	905,505	2,272	927,326	84,965	93,116	45,906	226,636	496,594	53.6	430,732	343,477	265,681	258,980
Lake Superior & Ishpeming	May	156	72,886	49	80,761	34,026	20,783	734	25,333	88,492	109.6	—7,731	—45,141	—46,499	291,615
	5 mos.	156	210,154	326	222,989	123,732	138,720	3,508	117,134	417,077	187.0	—194,088	—314,837	—318,015	260,250
Lehigh & Hudson River	May	96	113,537	411	114,546	6,924	18,528	3,634	41,334	76,726	67.0	37,820	24,094	11,433	14,830
	5 mos.	96	567,346	684	571,161	42,628	110,045	18,890	217,332	422,143	73.9	149,018	86,905	21,166	94,613
Lehigh & New England	May	205	289,688	.....	293,164	43,829	57,353	7,233	101,356	223,249	76.2	69,915	47,206	50,310	103,314
	5 mos.	209	1,309,554	.....	1,320,843	153,191	317,483	34,675	499,508	1,076,302	81.5	244,541	156,326	206,899	394,252
Lehigh Valley	May	1,307	3,031,729	172,524	3,425,808	183,669	644,188	113,398	1,480,729	2,553,291	74.5	872,517	576,680	410,531	415,288
	5 mos.	1,307	14,582,762	921,021	16,574,833	930,692	3,202,183	565,012	7,793,059	13,156,601	79.4	3,418,232	1,967,931	961,774	2,925,358
Louisiana & Arkansas	May	606	469,815	9,123	498,359	72,604	71,524	32,058	136,799	332,461	66.7	165,898	118,219	100,401	103,743
	5 mos.	606	2,251,762	48,818	2,399,413	314,105	361,897	160,550	684,172	1,627,159	67.8	772,254	564,241	447,775	477,106
Louisiana, Arkansas & Texas	May	240	88,073	330	92,354	24,962	10,588	5,669	36,141	80,955	87.7	11,399	6,499	—4,760	7,818
	5 mos.	240	442,788	732	464,675	112,952	66,410	25,193	199,236	427,068	91.9	37,607	11,856	—55,273	10,848
Louisville & Nashville	May	4,938	5,528,371	473,507	6,488,116	608,303	1,434,160	162,389	2,404,511	4,883,406	75.3	1,604,710	1,042,591	930,170	1,566,408
	5 mos.	4,938	25,820,152	2,626,644	30,816,683	3,390,296	7,129,357	970,852	12,303,432	25,220,572	81.8	5,596,111	2,732,835	2,564,878	6,943,516
Maine Central	May	997	754,380	69,990	905,402	141,564	158,909	10,610	334,611	681,500	75.3	223,902	147,703	115,895	195,888
	5 mos.	1,004	4,135,514	357,393	4,884,218	777,604	885,178	56,892	1,872,313	3,769,610	77.2	1,114,608	771,680	491,968	1,077,818
Midland Valley	May	352	91,324	4	92,760	13,503	14,072	2,477	26,063	61,579	66.4	31,181	19,261	15,907	13,011
	5 mos.	352	481,791	38	490,886	64,551	66,957	13,156	145,099	319,280	65.0	171,606	111,010	84,526	158,563
Minneapolis & St. Louis	May	1,523	632,263	7,282	673,027	120,243	129,301	42,282	268,387	587,329	87.3	85,698	41,814	13,014	984
	5 mos.	1,525	3,104,052	44,210	3,312,935	459,248	610,509	216,264	1,392,250	2,847,942	86.0	464,993	248,171	82,658	—121,596
Minneapolis, St. Paul & Sault Ste. Marie	May	4,297	1,604,388	75,657	1,836,331	273,351	349,537	59,107	851,366	1,620,286	88.2	216,045	24,451	—74,504	210,115
	5 mos.	4,298	7,594,737	368,588	8,744,518	1,272,480	1,887,007	300,684	4,526,233	8,420,428	96.3	324,090	—566,943	—1,177,493	310,016
Duluth, South Shore & Atlantic	May	549	121,684	9,734	143,136	33,518	26,919	3,937	69,175	139,459	97.4	3,677	—9,039	—12,837	80,199
	5 mos.	549	577,008	55,918	697,001	160,791	157,875	22,026	382,275	738,848	106.0	—41,847	—108,718	—132,647	181,136
Spokane International	May	164	49,482	1,330	57,063	22,979	8,462	2,227	21,329	60,012	105.2	—2,949	—8,245	—11,386	—2,554
	5 mos.	164	229,878	6,141	265,356	68,430	38,975	10,777	107,166	249,138	93.9	16,218	—9,303	—20,463	11,989
Mississippi Central	May	150	57,858	1,734	62,253	12,090	9,120	7,209	18,989	52,220	83.9	10,033	5,484	673	—8,784
	5 mos.	150	295,336	9,063	315,237	60,166	50,944	36,555	110,064	282,280	89.5	32,957	9,469	—16,483	6,202
Missouri-Arkansas	May	365	70,488	1,682	77,875	19,886	9,561	4,476	26,292	64,210	82.5	13,665	9,873	2,364	5,670
	5 mos.	365	363,803	7,615	397,027	106,765	56,793	26,723	150,723	362,438	91.3	34,589	14,642	—22,589	—3,212
Missouri-Illinois	May	193	86,655	753	88,950	23,566	12,459	2,998	36,023	80,326	90.3	8,624	2,202	—6,444	9,692
	5 mos.	193	422,173	2,391	433,155	80,531	67,422	14,288	162,116	350,763	81.0	82,392	50,292	4,054	84,677
Missouri-Kansas-Texas Lines	May	3,294	1,709,498	175,169	2,104,537	344,535	382,814	109,384	909,425	1,875,947	89.1	228,590	44,364	—125,871	152,182
	5 mos.	3,294	8,747,547	832,004	10,694,605	1,628,645	1,866,177	560,708	4,617,028	9,346,425	87.4	1,348,180	522,403	—364,415	1,152,278
Missouri Pacific	May	7,175	5,092,511	412,178	6,092,317	971,238	1,239,886	246,438	2,445,125	5,170,675	84.9	921,642	433,371	49,300	371,817
	5 mos.	7,175	25,978,945	2,059,385	30,975,631	4,434,260	6,304,617	1,203,630	12,755,721	26,062,602	84.1	4,913,029	2,456,054	587,372	3,768,627

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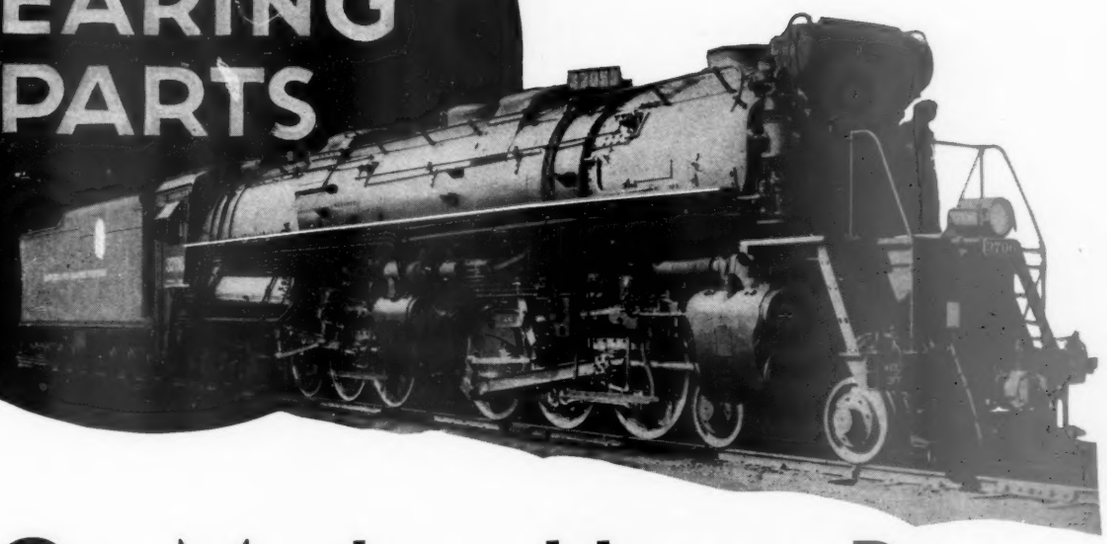
HSGI WEARING PARTS



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HUNT-SPILLER *Air Furnace* GUN IRON

REVENUES AND EXPENSES OF RAILWAYS

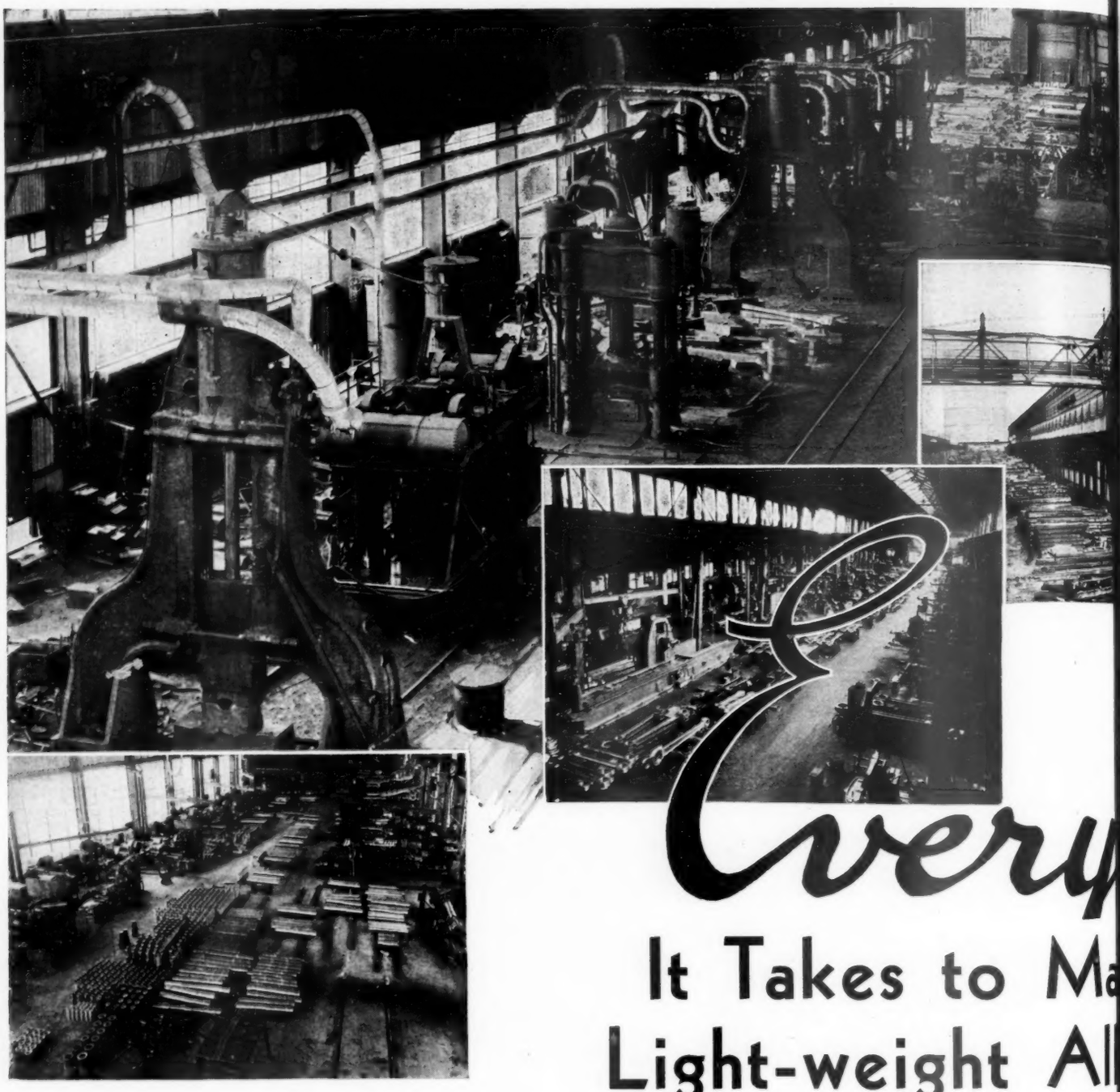
MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1938—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income 1938	1937
Gulf Coast Lines	May	1,767	$1,249,308	$34,881	$1,350,269	$210,533	$192,379	$45,634	$413,819	$910,900	67.46	$439,369	$365,394	$243,696	$262,129
	5 mos.	1,767	6,951,981	202,716	7,447,442	978,752	950,337	231,713	2,196,507	4,598,879	61.75	2,848,563	2,478,661	1,762,456	2,467,285
International Great Northern	May	1,155	810,967	61,325	968,152	156,472	192,661	31,930	454,147	886,104	91.53	82,048	23,131	—79,956	—22,654
	5 mos.	1,155	4,092,776	378,192	5,009,880	749,693	973,787	160,082	2,295,196	4,455,624	88.94	554,256	253,508	—291,267	—781
Mobile & Ohio	May	1,194	821,399	26,874	890,360	115,937	143,744	42,094	341,754	686,808	77.1	203,552	146,281	78,610	106,743
	5 mos.	1,194	4,372,853	128,836	4,771,160	582,034	854,695	213,577	1,915,520	3,783,979	79.3	987,181	683,773	285,812	603,318
Monongahela	May	172	258,952	639	261,078	18,442	15,874	515	58,331	96,171	36.8	164,907	134,587	67,501	93,779
	5 mos.	172	1,214,903	3,310	1,226,379	107,026	95,660	2,510	315,074	536,873	43.8	689,506	536,982	197,449	582,120
Montour	May	56	112,312	.....	112,859	14,392	35,464	917	27,892	85,006	75.3	27,853	13,127	31,687	113,105
	5 mos.	56	540,575	.....	548,063	45,143	178,242	4,973	169,258	429,950	78.4	118,113	42,659	162,187	382,598
Nashville, Chattanooga & St. Louis	May	1,116	968,268	72,880	1,156,468	86,181	191,590	63,500	452,205	849,018	73.4	307,450	236,278	214,470	45,129
	5 mos.	1,116	4,478,489	480,032	5,583,477	611,757	950,877	334,181	2,333,878	4,524,149	81.0	1,059,328	679,597	539,545	677,686
Nevada Northern	May	166	43,781	1,341	50,368	8,354	3,780	1,315	10,168	28,781	57.1	21,587	11,850	15,168	17,475
	5 mos.	166	180,516	6,185	213,191	38,829	17,315	6,155	51,695	139,287	65.3	73,904	32,307	49,448	95,488
New York Central	May	11,077	15,629,733	4,505,657	22,896,666	2,417,706	4,426,104	557,709	9,698,661	18,309,941	80.0	4,586,725	1,717,414	902,346	3,956,380
	5 mos.	11,079	77,996,769	23,814,360	115,902,370	12,232,366	24,115,185	2,726,074	51,535,654	96,980,645	83.7	18,921,725	4,339,098	—814,057	21,345,947
Pittsburgh & Lake Erie	May	233	891,077	45,118	977,147	104,609	345,697	29,118	411,407	970,017	99.3	7,130	—113,587	51,997	588,097
	5 mos.	233	4,239,084	226,762	4,684,699	478,523	1,770,520	141,879	2,177,162	4,972,219	106.1	—287,520	—838,164	44,993	2,000,520
New York, Chicago & St. Louis	May	1,704	2,566,885	71,285	2,737,642	278,769	462,549	120,078	1,095,958	2,074,412	75.8	663,230	467,584	224,544	572,564
	5 mos.	1,704	13,077,862	333,535	13,917,191	1,471,463	2,363,829	598,550	5,728,515	10,758,761	77.3	3,158,430	2,146,048	891,285	3,651,484
New York, New Haven & Hartford	May	2,020	3,206,013	2,044,360	5,875,221	912,059	1,096,126	113,235	2,456,691	4,960,808	84.4	914,413	414,413	151,852	161,441
	5 mos.	2,023	15,169,487	10,497,283	28,844,297	3,792,953	5,469,002	517,331	12,701,341	24,357,034	84.4	4,487,263	1,927,263	—556,515	3,274,406
New York Connecting	May	21	157,948	.....	164,476	14,457	8,188	.....	29,374	53,273	32.4	111,203	69,360	43,989	119,873
	5 mos.	21	806,961	.....	845,048	65,072	58,344	.....	154,709	284,468	33.7	560,580	365,169	241,436	697,599
New York, Ontario & Western	May	576	450,216	24,470	517,894	72,673	123,825	19,992	248,315	490,638	94.7	27,256	—25,436	—56,382	12,864
	5 mos.	576	2,226,913	53,082	2,504,751	327,864	641,682	70,496	1,307,947	2,478,442	98.9	26,309	—239,276	—385,166	28,348
Norfolk & Western	May	2,200	4,868,870	141,077	5,179,617	613,649	1,241,325	145,145	1,497,619	369,919	71.3	1,487,698	798,265	986,449	2,583,716
	5 mos.	2,200	25,223,096	747,684	26,887,716	3,431,952	6,345,039	702,485	7,761,298	19,191,756	71.4	7,695,960	3,455,343	4,228,403	13,666,332
Norfolk Southern	May	809	363,854	3,321	382,457	67,034	51,473	24,947	140,168	307,361	80.4	75,096	40,426	20,889	5,237
	5 mos.	809	1,582,878	20,259	1,683,087	317,074	260,402	121,015	670,696	1,489,915	88.5	193,172	22,375	—47,896	102,290
Northern Pacific	May	6,721	3,260,792	272,936	3,964,816	789,820	878,658	201,181	1,686,805	3,826,647	96.5	138,169	—440,968	—161,004	335,667
	5 mos.	6,721	16,290,977	1,390,996	19,662,921	2,778,131	4,800,374	880,461	8,897,916	18,731,916	95.3	931,005	—1,942,606	—440,125	2,574,902
Northwestern Pacific	May	352	198,706	58,240	280,573	73,250	52,964	3,846	163,916	306,265	109.2	—25,692	—44,927	—55,546	17,548
	5 mos.	352	655,342	231,937	993,019	384,919	245,691	20,398	794,790	1,507,342	151.8	—514,323	—607,608	—658,546	—64,178
Oklahoma City-Ada-Atoka	May	132	30,707	323	32,668	9,719	3,726	819	10,740	27,077	82.9	5,591	2,207	—2,749	5,573
	5 mos.	132	169,309	1,803	180,070	39,829	11,410	4,336	56,080	121,904	67.7	58,166	42,688	15,184	24,752
Pennsylvania	May	10,306	19,775,092	5,088,841	27,684,173	2,677,933	4,933,659	724,627	10,663,717	20,237,223	73.1	7,446,950	4,043,259	3,239,126	6,591,119
	5 mos.	10,306	97,521,427	27,006,386	138,507,372	13,962,679	26,097,461	3,326,205	56,014,290	105,821,603	76.4	32,685,769	17,622,298	13,888,528	31,061,398
Long Island	May	394	547,629	1,345,604	1,981,387	146,890	297,560	7,637	944,769	1,433,613	72.4	547,774	228,828	28,057	136,431
	5 mos.	394	2,436,006	5,969,564	8,809,402	812,390	1,540,393	33,259	4,759,850	7,303,603	82.9	1,505,799	359,001	—395,348	—229,923
Pennsylvania-Reading Seashore Lines	May	412	191,293	173,656	384,324	74,925	88,200	7,070	257,505	444,095	115.6	—59,771	—138,966	—202,095	—129,697
	5 mos.	412	1,005,756	609,135	1,706,892	364,370	387,716	35,314	1,322,279	2,191,318	128.4	—484,426	—852,178	—1,142,305	—995,855
Pere Marquette	May	2,115	1,720,749	62,111	1,888,158	296,451	432,152	65,707	806,171	1,695,061	89.8	193,097	39,072	—67,537	333,462
	5 mos.	2,115	8,695,358	337,341	9,534,756	1,478,036	2,292,262	316,425	4,261,555	8,831,303	92.6	703,453	—60,759	—564,425	2,215,324
Pittsburg & Shawmut	May	100	38,662	.....	38,966	11,689	11,566	1,541	12,002	41,270	105.9	—2,304	—3,796	—2,467	—18,131
	5 mos.	100	204,774	947	208,208	45,305	83,492	8,167	76,897	238,206	114.4	—29,998	—38,088	—31,541	4,701
Pittsburgh & West Virginia	May	136	200,792	.....	217,818	29,312	52,210	16,126	56,315	177,045	81.3	40,773	17,251	30,466	56,993
	5 mos.	136	1,016,093	.....	1,101,990	158,557	257,545	81,085	292,298	899,746	81.6	202,244	127,388	200,713	529,857
Pittsburg, Shawmut & Northern	May	190	65,704	.....	66,382	14,202	10,565	1,026	23,491	55,586	83.7	10,796	6,036	—1,204	—8,855
	5 mos.	190	353,219	1	357,092	64,959	62,465	5,520	137,070	300,442	84.1	56,650	31,385	—11,643	14,551
Reading	May	1,451	3,680,678	271,803	4,117,079	209,044	716,053	77,304	1,668,557	2,825,728	68.6	1,291,351	950,971	976,760	991,019
	5 mos.	1,452	17,249,954	1,352,913	19,531,833	1,158,502	4,120,774	383,273	8,766,047	15,188,403	77.8	4,343,430	2,915,114	3,055,203	6,466,803
Richmond, Fredericksburg & Potomac	May	118	419,988	139,412	651,992	78,542	133,566	9,561	265,919	531,283	81.5	120,709	73,123	23,493	103,498
	5 mos.	118	1,852,371	1,188,497	3,575,075	342,616	682,842	48,758	1,516,979	2,844,428	79.6	730,647	473,409	185,981	631,225

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1938—CONTINUED

Name of road		Av. mileage operated during period	Operating revenues: Freight	Passenger	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures	Equipment	Traffic	Transportation	Total	Operating ratio	Net from railway operation	Operating income	Net railway operating income: 1938	1937
Rutland	May	407	$169,541	$23,510	$250,233	$35,212	$56,659	$11,250	$138,795	$255,914	102.3	—$5,681	—$35,225	—$37,423	$26,557
	5 mos.	407	751,423	139,562	1,160,042	177,599	310,077	54,151	717,570	1,338,929	115.4	—178,887	—325,151	—329,002	34,536
St. Louis-San Francisco	May	4,885	2,723,861	256,837	3,287,899	554,380	824,390	114,318	1,411,957	3,087,488	93.9	200,411	—167,765	—217,740	244,454
	5 mos.	4,885	13,632,194	1,296,543	16,454,867	2,795,938	4,160,388	572,756	7,146,112	15,611,529	94.9	843,338	—753,866	—892,525	1,690,729
St. Louis, San Francisco & Texas	May	266	109,067	501	115,420	23,240	13,793	7,964	55,513	106,860	92.6	8,560	395	—31,011	—26,199
	5 mos.	266	563,747	2,599	593,458	120,978	70,521	39,553	278,393	541,565	91.3	51,893	11,441	—143,645	—175,900
St. Louis Southwestern Lines	May	1,706	1,462,283	21,600	1,547,224	245,119	186,031	80,427	540,846	1,127,443	72.9	419,781	331,682	203,273	169,711
	5 mos.	1,706	6,921,903	109,110	7,341,081	1,070,922	993,088	406,626	2,772,318	5,613,876	76.5	1,727,205	1,205,080	451,646	865,757
Seaboard Air Line	May	4,318	2,643,479	310,352	3,269,851	533,784	670,616	151,886	1,258,638	2,785,937	85.2	483,914	183,914	98,952	325,804
	5 mos.	4,318	13,725,965	2,756,777	18,313,355	2,360,254	3,472,877	859,894	6,973,799	14,713,989	80.3	3,599,366	1,964,366	1,179,201	2,843,624
Southern Railway	May	6,602	5,427,948	629,191	6,638,683	895,211	1,182,922	150,805	2,381,651	4,907,264	73.9	1,731,419	1,142,371	797,591	1,313,251
	5 mos.	6,609	28,115,862	3,517,161	34,597,224	4,549,252	6,407,034	777,046	13,394,429	26,702,107	77.2	7,895,117	4,743,593	2,962,240	8,289,129
Alabama Great Southern	May	315	437,857	47,020	522,430	90,860	134,142	12,041	169,401	428,903	82.1	93,527	31,482	65,228	72,685
	5 mos.	315	2,068,992	226,001	2,489,270	426,372	648,903	60,479	860,424	2,111,611	84.8	377,659	131,573	343,591	547,342
Cincinnati, New Orleans & Texas Pacific	May	337	1,088,133	61,588	1,222,411	172,487	253,964	28,059	338,803	839,714	68.7	382,697	259,606	275,655	477,169
	5 mos.	337	4,993,652	551,806	5,929,978	855,973	1,317,651	139,407	1,660,010	4,244,652	71.6	1,685,326	1,115,859	1,285,104	2,135,470
Georgia Southern & Florida	May	398	105,464	21,106	144,614	29,870	36,383	2,104	74,976	148,983	103.0	—4,369	—21,386	—23,783	7,801
	5 mos.	398	498,166	282,284	888,037	161,650	171,848	9,339	409,763	797,461	89.8	90,576	4,272	—14,672	164,453
New Orleans & Northeastern	May	204	213,481	17,429	246,782	36,686	32,894	6,360	72,036	159,791	64.7	86,991	56,015	32,114	33,087
	5 mos.	204	1,041,480	86,184	1,208,070	177,626	184,384	31,161	406,245	861,524	71.3	346,546	194,168	69,102	258,358
Northern Alabama	May	100	35,161	1,097	37,857	5,893	1,296	1,216	15,250	25,680	67.8	12,177	6,561	—5,269	5,669
	5 mos.	100	220,827	5,767	234,157	46,740	6,601	5,846	84,306	154,456	66.0	79,701	51,156	—10,800	68,344
Southern Pacific	May	8,707	9,188,813	1,647,893	11,918,816	1,528,906	2,261,104	371,161	4,918,097	9,850,228	82.6	2,068,588	820,978	75,016	760,243
	5 mos.	8,717	42,567,063	8,252,248	56,029,534	7,320,821	10,891,071	1,765,172	24,718,490	48,606,088	86.8	7,423,446	1,487,721	—1,869,569	6,931,642
Southern Pacific Steamship Lines	May	....	540,886	25,871	591,917	12,388	88,794	18,797	386,168	522,858	88.3	69,059	55,000	54,762	—33,603
	5 mos.	....	2,419,310	108,189	2,657,453	71,805	503,014	88,233	2,015,394	2,764,501	104.0	—107,048	—184,613	—185,639	11,730
Texas & New Orleans	May	4,416	2,921,035	240,184	3,439,584	509,512	597,271	119,844	1,229,416	2,668,234	77.6	771,350	468,047	288,540	296,559
	5 mos.	4,419	14,317,654	1,319,472	17,050,101	2,599,327	3,225,174	611,978	6,290,201	13,817,024	81.0	3,233,077	1,685,916	645,478	2,532,589
Spokane, Portland & Seattle	May	947	495,033	30,561	575,199	129,804	98,473	9,751	253,340	522,532	90.8	52,667	—24,243	—67,816	142,822
	5 mos.	947	2,586,595	164,804	2,973,755	•519,301	445,041	48,273	1,224,501	2,381,245	80.1	592,510	233,031	46,537	639,146
Tennessee Central	May	287	151,154	4,609	165,263	30,807	25,039	6,183	64,293	136,530	82.6	28,733	16,900	2,959	20,875
	5 mos.	287	818,499	19,539	886,514	152,928	137,231	30,308	340,221	711,662	80.3	174,852	114,746	35,344	138,548
Texas & Pacific	May	1,937	1,750,888	193,608	2,132,481	225,098	374,261	73,444	685,539	1,476,368	69.2	656,113	513,229	427,822	581,401
	5 mos.	1,937	8,509,165	1,003,621	10,409,031	1,091,630	1,797,053	368,935	3,608,068	7,468,686	71.8	2,940,345	2,197,163	1,559,709	2,531,628
Texas Mexican	May	162	84,275	346	97,238	14,605	12,711	2,787	35,913	71,930	74.0	25,308	18,655	13,488	44,089
	5 mos.	162	418,952	2,606	484,568	76,146	77,533	16,262	193,950	394,974	81.5	89,594	77,403	50,869	140,737
Toledo, Peoria & Western	May	239	180,818	.....	183,406	62,811	15,308	15,950	46,763	154,407	84.2	28,999	35,182	22,111	863
	5 mos.	239	846,937	3	858,240	220,014	62,077	82,961	208,723	625,320	72.9	232,920	164,058	94,118	121,748
Union Pacific System	May	9,912	8,267,374	1,254,081	10,519,961	1,179,689	2,159,839	386,093	3,802,745	8,200,812	78.0	2,319,149	1,041,116	379,812	569,133
	5 mos.	9,912	40,564,309	5,768,930	51,165,139	4,712,379	9,972,576	1,701,472	19,215,899	38,963,351	76.2	12,201,788	5,975,398	3,035,097	4,141,274
Utah	May	111	32,260	.....	32,379	11,857	15,086	Cr. 422	8,902	37,751	116.6	—5,372	—10,939	—13,788	—10,740
	5 mos.	111	244,786	.....	245,380	50,943	91,998	1,360	79,557	242,876	99.0	2,504	—37,306	—51,827	35,472
Virginian	May	619	1,382,611	2,836	1,433,538	133,984	340,104	23,152	245,933	768,934	53.6	664,604	489,604	563,744	660,880
	5 mos.	619	7,175,109	14,987	7,461,501	724,058	1,773,797	113,635	1,273,707	4,019,934	53.9	3,441,567	2,496,567	2,769,063	3,741,638
Wabash	May	2,434	2,832,576	186,299	3,260,484	429,757	516,463	152,292	1,359,134	2,608,966	80.0	651,518	432,207	99,056	238,015
	5 mos.	2,434	13,482,433	941,671	15,587,797	1,981,814	2,817,242	744,510	7,035,581	13,338,947	85.6	2,248,850	1,138,364	—613,998	2,386,228
Ann Arbor	May	294	256,541	2,256	267,055	31,008	64,953	12,831	124,168	245,136	91.8	21,919	1,722	—11,201	12,185
	5 mos.	294	1,308,862	12,536	1,358,005	133,061	321,204	64,515	658,460	1,237,588	91.1	120,417	21,193	—50,488	155,859
Western Maryland	May	879	928,781	6,529	965,824	140,179	232,904	35,131	293,282	718,216	74.4	247,608	224,501	220,658	315,824
	5 mos.	879	5,182,492	30,039	5,409,569	628,791	1,248,876	186,562	1,611,766	3,868,947	71.5	1,540,622	1,167,515	1,214,226	2,175,425
Western Pacific	May	1,208	1,098,979	20,555	1,150,869	513,377	200,571	57,785	470,948	1,296,237	112.6	—145,368	—234,949	—276,918	—210,617
	5 mos.	1,208	4,508,989	100,099	4,748,217	1,673,327	1,184,276	282,715	2,434,747	5,836,185	122.9	—1,087,968	—1,543,590	—1,826,534	—615,802
Wheeling & Lake Erie	May	513	720,444	1,604	753,371	72,807	177,576	33,184	292,249	603,327	80.1	150,044	59,219	86,072	419,437
	5 mos.	513	3,493,681	8,768	3,646,649	364,284	899,389	165,236	1,469,780	3,032,455	83.2	614,194	169,079	375,141	2,046,793



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Light-weight Al

WITH the advent of higher speeds demanding lighter reciprocating parts, Alco was cognizant of the fact that the facilities heretofore used were entirely inadequate.

Realizing that an entirely different manufacturing set-up including equipment and personnel was imperative, Alco remodeled its entire forging department. Expensive appliances adapted to the working of alloy steel were placed in service—up-to-date forging machinery—scientific testing apparatus—special preheating and heat-treating furnaces—modern temperature control devices—special finishing machinery and many other costly items.

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